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Current status of open access journals published in D8 countries and registered in the Directory of Open Access Journals (pre-2000 to 2014)

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Abstract

Purpose – The study aims to monitor the status of open access (OA) journals published in Developing 8 (D-8) countries, i.e. Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey.

Design/methodology/approach – The authors' web-based data sources for journal-based metrics were the Directory of Open Access Journals (DOAJ), Thomson Reuters (Journal Citation Reports [JCR], which provided journal impact factors [JIF]) and Scopus (source normalized impact per paper [SNIP] and SCImago journal rank [SJR]). The authors obtained information about journals published before 2000 to 2014. From the JCR, JIF, Rank in Category, Total Journals in Category, Journal Rank in Category, and Quartile in Category were used.

Findings – The authors' identified 1,407 OAJ published in D-8 countries. Egypt published the most journals (490) and Bangladesh the fewest (29). Egypt, Iran and Turkey accounted for approximately 73.5 per cent of all journals. At the time of study, 10,162 journals were registered in DOAJ, and 13.8 per cent of them were published in D-8 countries. The mean JIF for all journals from individual countries was highest for Pakistan (0.84), followed by Iran (0.74) and Turkey (0.57). The mean SNIP for all journals from each country was highest for Nigeria (0.57), followed by Egypt (0.57) and Pakistan (0.51).

Practical implications – The widespread use of OA publishing models in D-8 countries will boost accessibility of their journals' content and ultimately impact research in D-8 states.

Originality/value – Journals published in Egypt, Iran and Turkey account for approximately three-fourths of all OA journals published in D-8 countries. More than one-third (38 per cent) of the journals the authors studied used a Creative Commons (CC) BY license, a hallmark of OA research findings. Most of the journals with a JIF were in the JCR Medical Sciences category (60 per cent). As the number of journals in D-8 countries increases, publishers should attempt to make their journals eligible for indexing in-citation databases. The authors recommend efforts to improve the quality of journals in other subject categories, so that as many as possible become eligible for indexing in JCR.

Keywords Open access, Journals, Scopus, Thomson Reuters, DOAJ, D-8 countries

Paper type Research paper

Introduction

Since the inception of new information and communication technologies, especially the World Wide Web and the internet, the Open Access (OA) movement has been at the forefront of journal development. Toll access journals (TAJs) permit researchers to access their peers' scientific findings through individual or institutional subscriptions, whereas open access journals (OAJs) pave the way for more access to research findings

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by removing "permission and price barriers" (Suber, 2012, p. 39). Commercial publishers advocate for TAJs as a way to keep inelastic markets active to protect their price monopolies. These monopolies, together with permission barriers, support their strategies for managing the journal publishing industry. One result is that journal prices are increasing above the inflation rate and thereby, are bringing about a financial crisis for research libraries (Bosch and Henderson, 2012; Odlyzko, 2013). Consequently, libraries cannot afford to buy scientific journals because of high prices and access to the latest scientific findings is hindered for researchers and other library patrons. In addition, commercial publishing licenses often require authors to give away rights to the content. Restrictive copyright and licensing policies lead to the author's loss of control over publications mostly funded by public investments (Suber, 2012). To resolve this dilemma, researchers and librarians worked together to develop OA publications.

Three declarations – the Budapest Open Access Initiative (February 2002), the Bethesda Statement on Open Access Publishing (June 2003) and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (October 2003), known collectively as the BBB statements, marked the beginning of the OA movement. The belief in free access to scientific content from the scientists' point of view, along with the advent of new information and communication technologies, provided a supportive foundation for global development and success of the OA movement. New opportunities have led to the rethinking of scholarly communication (Van de Sompel *et al.*, 2004). Contributors, as one of the stakeholders in scholarly communication, gradually welcomed OAJs as a new model of journal publishing (Creaser *et al.*, 2010; Ghane, 2006; Harjuniemi, 2012; Swan and Brown, 2005; Van Rooyen, 2014). At present, commercial publishers use three types of OA business models: hybrid, partial or delayed access. Major commercial journal publishers, such as Elsevier, Springer and Wiley, have gradually provided more information about their policies on their websites in response to OA initiatives.

Since the start of the OA movement, the scientific community has warmly welcomed the new model of global distribution of the products of research, although enthusiasm has varied across disciplines. The growth rate of OAJs varies from region to region around the world. These variations reflect differences in researcher-centered advocacy for making their research findings accessible to others through OAJs or institutional or subject-based repositories.

The present study evaluates the status of OAJs in member states of the Developing 8 countries (D-8) (D-8 Organizations for Economic Cooperation, 1997): Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey. By monitoring the current situation and growth of OAJs in this group of countries with common characteristics, the authors hope to trace the strengths and weaknesses of these types of journals in the current competitive environment. The specific objectives of the study are as follows:

- To identify the leading D-8 countries that publish OAJs;
- To quantify the annual growth rate of OAJs in D-8 countries;
- To identify the type of CC licenses of D8 journals in the Directory of Open Access Journals (DOAJ);
- To compare journal metrics of D-8 OAJs in Journal Citation Reports (JCR) and SCOPUS; and
- To determine the year of DOAJ registration of D-8 OAJs.

Literature review

OA was initially a controversial issue as a new paradigm in scholarly communication and was confronted with protests from commercial publishers. Despite the negative views of commercial publishers, authors' attitudes toward OA are positive and their familiarity with this mode of communication is increasing (Chan and Kirsop, 2001; Harjuniemi, 2012; Hess *et al.*, 2007; Kenneway, 2011; Metcalfe *et al.*, 2009; Papin-Ramcharan and Dawe, 2006; Rowlands *et al.*, 2004; Swan and Brown, 2005, 2007; Togia and Korobi, 2014; Van Rooyen, 2014). Researchers have been willing to consider OAJs as a useful publication option in terms of their scientometric value [Open Citation Project (OPCIT), 2012]. In this respect, one of the most important issues is the visibility of research outputs that can lead to greater readership and, thus, affect the author and journal impact. More readers generally result in higher levels of citations (Davis, 2011). A noteworthy aspect of journal and author evaluation is ranking using citations (often called impact) as a unit of measurement (Bornmann *et al.*, 2008). Consequently, visibility and readership affect research diffusion and impact (Kim, 2012). With the rise of the OA movement, scholars have studied this development from different angles.

Geographical features of interest in OA have been examined in several different regions (Björk *et al.*, 2010; De Beer, 2005; Ennas and Diguardo, 2015; Hernández-Borges *et al.*, 2006; Hu *et al.*, 2012; Shin, 2012) and internationally (Swan and Brown, 2004). The inequities in the distribution of scientific literature in developed and developing countries is a matter of importance (Ahmed, 2007; Arunachalam, 2003, 2008; Chan and Kirsop, 2001; Ghosh and Das, 2007; Gómez *et al.*, 2009; Haider, 2007; Harnad and Swan, 2008; Kirsop *et al.*, 2007; Kirsop, 2008; Kuchma, 2008; Metcalfe *et al.*, 2009; Papin-Ramcharan and Dawe, 2006; Smart, 2003, 2004). Bridging the information gap between developed and developing countries is the subject of several other studies (Ahmed, 2007; Smart, 2003, 2004). OA is expected to help reduce this gap through the additional use of information and communication technologies (Ahmed, 2007; Papin-Ramcharan and Dawe, 2006) and bridge the digital divide (Arunachalam, 2003). OA mandates for publicly funded research are policies that should be adopted by governments and higher education institutes in developed and developing countries (Arunachalam, 2008; Kirsop *et al.*, 2007; Kuchma, 2008). Solutions have also been proposed to favor free access to scientific literature, such as open archiving, institutional repositories and OAJs (Chan and Kirsop, 2001; Ghosh and Das, 2007; Kirsop, 2008), as key policy elements for sustainable development (Arunachalam, 2008; Kirsop *et al.*, 2007).

The advantages of OA articles, as related to citation counts, are another issue of importance to scholarly communication stakeholders. In her report, Swan (2010) reviewed the findings of different studies to determine advantages for citation metrics of making research results OA. She noted that the results of 27 studies found a positive OA advantage, whereas four studies found a citation disadvantage for OA documents. Wagner (2010) provided an annotated bibliography regarding the citation advantage of OA articles versus non-open access articles. He classified the studies into three groups: reviews, OA advantage and no advantage of OA. The bibliographies published by Swan (2010), Wagner (2010) are useful for those who are interested in OA contents and in following the citation histories of OA and toll access articles.

Economic aspects of scholarly journal publishing are a significant issue for researchers, given that every OAJ uses some kind of business model. One revenue-generating model used by fee-based journals is the article processing charge (APC). Solomon and Björk (2012) examined APCs of articles and journals indexed in

DOAJ and found an average APC per article of US$906. Their study also showed that journals in developing countries had lower APCs compared to those produced by international publishers. Solomon *et al.* (2013) demonstrated that the citation average of APC journals was the same as fee-based journals during a 2-year sampling window. These authors argued that the citation growth associated with other OAJ business models was less than in journals whose main sources of revenue are APCs and subscriptions, and they hypothesized that the difference reflected the influence of the English language rather than differences in the quality of the journal articles. The author-pay model in hybrid journals has come to be viewed as an unsuccessful attempt from the authors' perspectives, despite the spread of the hybrid journal business model in recent years (Björk, 2012). According to Morrison (2014):

> […] the current average revenue per scholarly journal article published globally is approximately USA$5000. BioMed Central is making a profit charging an average APC that is 37 per cent of this amount and PLOS is bringing in a 23 per cent surplus at less than 30 per cent of this amount.

The gold and green routes are the two main approaches to OA research publishing (Laakso, 2014; Ware and Mabe, 2012). The gold route includes full OAJ (born OAJ), delayed OAJ and hybrid OAJ. The hybrid model encourages APCs (gold route) but has not been privileged over the green route (self-archiving) (Van Noorden, 2013). In another study, Björk and Solomon (2015) surveyed the relationship between price and quality in terms of source normalized impact per paper (SNIP). They found a moderate correlation (0.40) between APCs and SNIP. Thus, they concluded that journal publishers are aligned with authors regarding the relationship between price and quality. In other words, quality is important for authors when deciding which journal to publish in and price (cost of the APC) is important when choosing an OAJ for their manuscript.

The growth rate of OAJs, articles and repositories (institutional and subject-based) has also been the subject of considerable research. These studies focused on the increase in the number of OAJs and articles (DOAJ, 2003; Gargouri *et al.*, 2012; Morrison, 2014; Solomon *et al.*, 2013). In this regard, initiatives – such as the Directory of Open Access Repositories – Open DOAR (2006) and the Registry of Open Access Repositories (ROAR) (2003) – provide information about the growth and development of repository types. A number of national-level studies have also investigated OAJs. Shin (2012) showed that 82.6 per cent of Korean journals in different subject areas are OA. In China, 685 OAJs are indexed in the Chinese National Knowledge Infrastructure (CNKI) database according to the journal's organizer, discipline, region and other aspects (Hu *et al.*, 2012). In light of the growing number of OAJs, the authors proposed an integrated archive.

The desire of many authors to make their work freely available to everyone, everywhere and at any time may counteract resistance from commercial publishers. The major industry publishers, including Elsevier, Springer and Wiley, use a hybrid business model for OA (for information visit their websites).

The studies cited above show that advocates of OA are monitoring the growth rate of journals, articles and archives in different disciplines and countries and are tracking the research impact of OAJs as they increase access to scientific research findings without price or permission barriers.

Study methodology

The aim of the present work is to characterize the state of OAJs in D-8 states. A survey was used to gather data. The web-based sources were DOAJ, Thomson Reuters and Scopus for the time span from 2000 to 2014. Data were collected between 3-12 January, 2015. Using the "Advanced Search" in DOAJ, the authors selected the "Journals vs Articles" option and limited the search to journals. Using the "Country of Publication" field, data about the journals published in each D-8 state were extracted. The data gathered included "ISSN", "Date added to DOAJ", "Journal License" and "Started publishing Open Access content in". The data were exported to Excel 2010 for descriptive statistical analysis.

Another aim of the study was to obtain metrics for journals indexed in DOAJ. To this end, the authors used Thomson Reuters' JCR and Scopus. Using JCR, each journal's impact factor (JIF) and "Rank in Category", followed by "Total Journals in Category", "Journal Rank in Category" and "Quartile in Category" were captured. In Scopus, from the "Browse Sources" menu, the journals' SCImago journal rank (SJR) and SNIP were extracted. Both JCR and Scopus were searched by ISSN. For this purpose, journals' ISSNs were verified in DOAJ. Then, the search was limited to specific journals within JCR and Scopus by selecting the ISSN option and all journals of interest were checked regarding their journal metrics.

Results and discussion

Between 2000 and 2014, a total of 1,407 OAJs from D-8 countries were published. Figure 1 shows that Egypt published the most journals (490) and Bangladesh the fewest (29). Egypt, Iran and Turkey together published 73.5 per cent of the journals (1,034) indexed in DOAJ. The remaining 26.5 per cent were from Indonesia, Pakistan, Malaysia, Nigeria and Bangladesh. At the time of this study, 10,162 journals were indexed in the DOAJ. The world share of D-8 OAJs was thus 13.8 per cent and, out of this percentage, 10.1 per cent comprised journals from Egypt, Iran and Turkey.

The annual percentage growth rate of D-8 journals indexed in DOAJ was 401 per cent. The annual percentage growth rate for each country is shown in Figure 2.

The growth rate was significantly faster for Egypt compared to the other seven countries. This reflects the fact that the number of OAJs doubled in Egypt from 2008 onward (Table I).

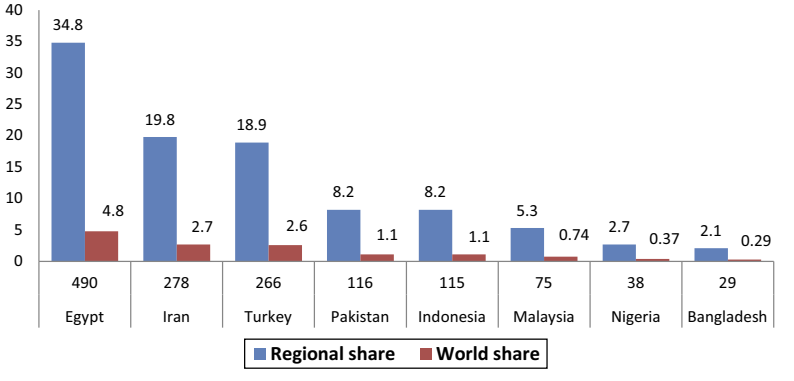


Figure 1.
Regional (D-8 countries) and world share of OAJs published in D-8 countries

The authors categorized the target population into four regions: Africa (Egypt and Nigeria), South Asia (Pakistan and Bangladesh), Southeast Asia (Malaysia and Indonesia) and the Middle East (Iran and Turkey). Figure 3 demonstrates that Middle Eastern and African journals were more active in making their content OA.

Licensing agreements

Commercial publishers usually want researchers to cede their copyright to the publisher. OA advocates are sensitive to the requirement that authors sign away their copyright. To enable authors to retain rights over their work, the Creative Commons (CC), a non-profit organization, was founded in 2001 by supporters of OA. The first version of the CC copyright license was launched in 2002 to allow the scientific community to share their work without permissions barriers.

CC offers several types of license for OAJ publishers. The findings show that D-8 journals mostly used CC-BY licenses (536 journals) and that all Egyptian journals preferred CC-BY. The second most frequent type of copyright license was CC BY-NC (99 journals), used by 46 Iranian journals. The other types of CC license, in decreasing order of frequency, were BY-NC-ND, BY-SA, Not CC-Like and BY-ND (Figure 4).

Notably, 536 journals used a CC-BY license, which was the most frequent option in the sample. All 460 Egyptian OAJs used a CC-BY license. Among Iranian OAJs, 21 used this type of license, followed by Turkey and Indonesia, each with 18 journals in this category. The critical point is that CC-BY focuses on encouraging commercial use while crediting the original work. The CC-BY license appears to provide greater visibility of the journal contents.

Among the journals studied, the second most frequent type of CC license was BY-NC, used by 99 OAJs. The difference between CC-BY and BY-NC licenses is that the latter permits only non-commercial use by others who wish to build upon the original work. Iranian journals were the most frequent users of the BY-NC license, with 46 OAJs, followed by Indonesia (27 journals) and Turkey (17 journals). The third most frequent type of CC license in our sample was BY-NC-ND, used by 59 OAJs. This type of license is more restrictive concerning permission to download and share the work with others, especially for commercial use. Indonesia and Turkey each had 16 OAJs with this type of license. In contrast, Iranian (12 OAJs) and Malaysian journals (6 OAJs) used BY-NC-ND less frequently. Journals published in D-8 countries used the other types of CC licenses

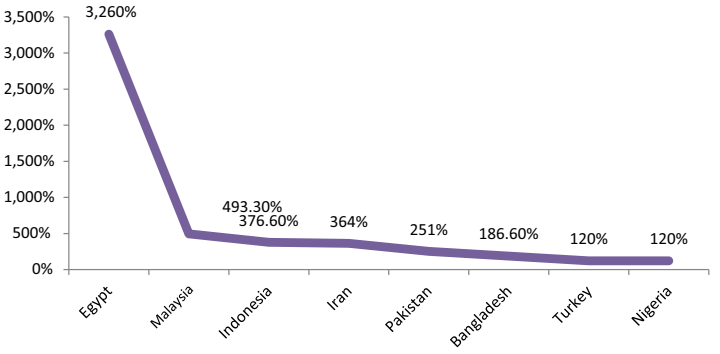


Figure 2.
Annual percentage growth rate of OAJs published in D-8 countries

Table I.
Number of OAJs published yearly by each D-8 country from 2000 to 2014

D8 countries	>2000	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Sum
Egypt	9	1	1	0	1	1	2	5	12	31	67	43	115	46	135	21	490
Iran	11	5	4	4	7	12	6	13	15	16	21	31	34	61	34	4	278
Turkey	38	14	7	14	7	14	10	8	13	16	20	27	36	26	14	2	266
Pakistan	2	0	3	8	1	2	14	8	10	14	6	6	12	14	16	0	116
Indonesia	16	2	3	4	2	3	6	1	5	6	8	11	11	29	7	1	115
Malaysia	6	1	1	2	2	2	4	9	9	2	10	11	10	6	0	0	75
Nigeria	0	0	2	3	1	0	0	6	3	4	2	4	1	5	7	0	38
Bangladesh	0	0	0	0	1	1	1	4	1	5	6	3	5	1	1	0	29

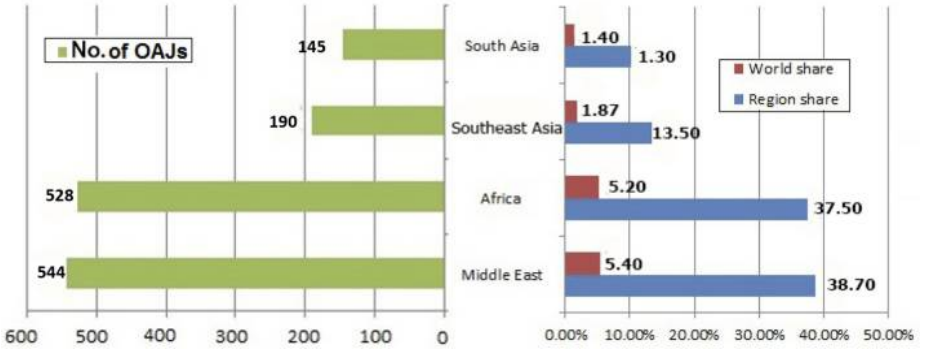


Figure 3.
World and regional share of OAJs from D-8 countries

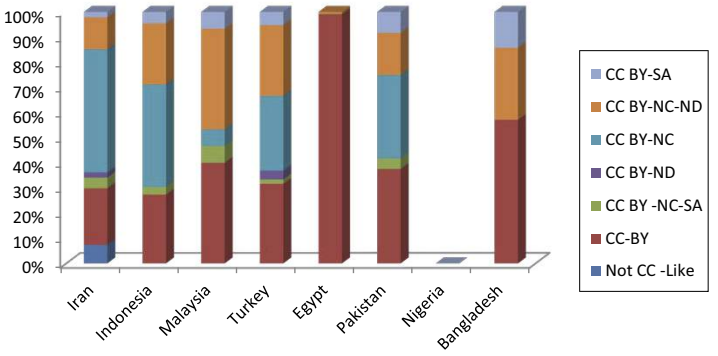


Figure 4.
Types of CC license used by D-8 journals in the DOAJ

less frequently, as the researchers identified 12 with a BY-SA license and 10 with a BY-NC-SA license.

Comparison of D-8 OAJs in DOAJ, JCR and Scopus

Of the 1,407 OAJs in the sample, 60 were indexed in Thomson Reuters JCR and their mean JIF was 0.48. Of interest, none of the Indonesian or Egyptian OAJs had a JIF. The number of OAJs indexed in Scopus was 354, which had a mean SJR of 0.20 and a mean SNIP of 0.42. The distribution by country of journals included in JCR and Scopus is shown in Table II.

Metrics, such as the JIF, SNIP and SJR, are indicators of a journal's impact in its field. The highest mean JIFs for OAJs from different countries were found for Pakistan (0.84), Iran (0.74) and Turkey (0.57), followed by Nigeria (0.50), Bangladesh (0.44) and Malaysia (0.24). Based on mean SNIP, Nigerian and Egyptian journals had the highest value (0.57), followed in decreasing order by Pakistan (0.51), Turkey (0.42), Iran (0.41), Malaysia (0.39), Bangladesh (0.31) and Indonesia (0.16). Figure 5 compares the mean JIF and SNIP of each country's OAJs indexed in both JCR and in Scopus. To find the correlation between JIF and SNIP in D-8 OAJs, the authors calculated the Pearson correlation coefficient, which yielded a moderate relationship ($r = 0.32$). In general, D-8 OAJs registered in DOAJ and that had both a JIF and an SNIP and a medium level of impact.

Table II.
D-8 OAJs indexed in JCR and Scopus

D8	JCR journals	IF average	Scopus journals	Mean SJR	Mean SNIP	% OAJs in JCR	% OAJs in Scopus
Turkey	31	0.57	77	0.02	0.42	11.7	29.0
Iran	20	0.74	68	0.21	0.41	7.0	24.4
Pakistan	5	0.84	42	0.21	0.51	4.3	36.2
Bangladesh	2	0.44	6	0.17	0.31	6.9	21.0
Malaysia	1	0.24	22	0.17	0.39	1.4	30.0
Nigeria	1	0.50	10	0.2	0.57	2.6	26.3
Indonesia	0	NA	11	0.12	0.16	NA	9.0
Egypt	0	NA	118	0.47	0.57	NA	24.0

Note: NA = Not applicable

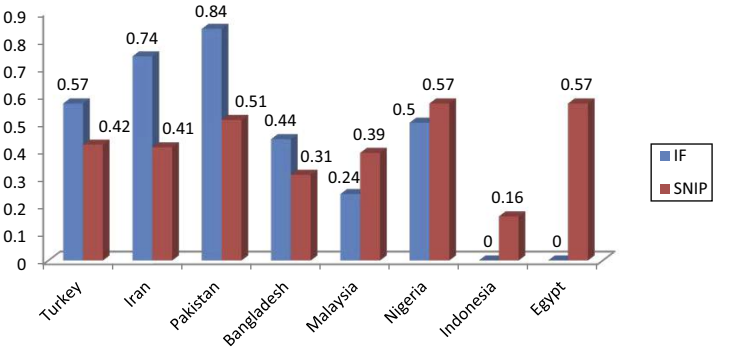
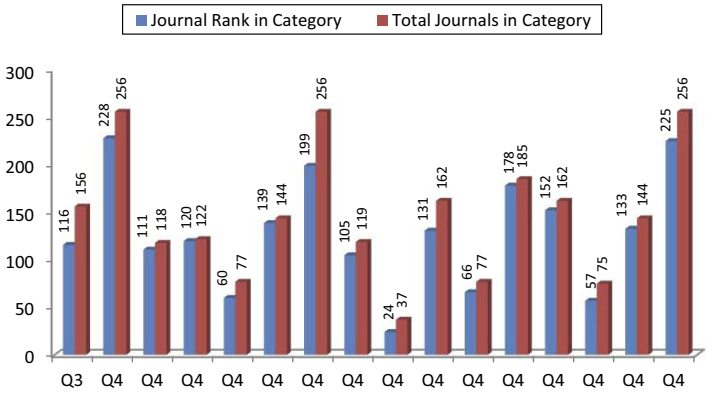


Figure 5.
Comparison of mean SNIP and mean JIF across D-8 countries

The authors recorded the subject category (according to JCR) and the quartile ranking of the OAJs in the sample. Turkey and Iran were analyzed separately from other D-8 countries for two reasons. First, they are scientific competitors. As of April 5, 2015, Web of Science (WoS) contained 386,078 documents affiliated to Turkey and 244,808 affiliated to Iran. In all, WoS contained 1,055,265 documents for all D-8 countries together. The share of documents pertaining to Turkey and Iran together comprised approximately 60 per cent of the D-8 total. In Scopus, the number of documents linked to D-8 countries was 1,269,184 as of April 5, 2015, and the share accounted for by Turkey (422,280 documents) and Iran (303,722) together was 57.2 per cent. Second, out of 60 journals with a JIF published in D-8 countries, 51 titles (85 per cent) were published in Turkey or Iran. Turkey (31) and Iran (20) had the largest numbers of OAJs indexed in JCR. Most of the Iranian journals belonged to the medical sciences category (Figure 6), with 15 journals in Q4 and 1 in Q3. Two Iranian journals were in Engineering (1 each in Q3 and Q4) and two were in Mathematics (1 in Q4 and 1 journal, for which information about the quartile rank was not available).

Among Iranian OAJs registered in DOAJ, all were ranked in JCR Q4 according to their JIF. Turkish OAJs in DOAJ belonged to a larger variety of subject categories than Iranian OAJs (Table III). Among the Turkish journals, OAJs in six categories were



Notes: Numbers at the top of each bar show journal rank (blue bars) and the total number of journals in the category (red bars)

Figure 6.
Quartile ranking of OAJs from Iran in the JCR Medical Sciences category

Subject category	Quartile in category	Journal rank in category	Total journals in category
Geoscience	Q2	86	174
Agriculture	Q3	48	79
Agriculture	Q3	117	199
Agriculture	Q3	41	79
Agriculture	Q4	46	56
Environment	Q3	135	216
Chemistry	Q3	91	148
Engineering	Q3	185	248
Zoology	Q3	125	153
Sport science	Q3	56	81
Biology	Q3	46	85
Veterinary	Q4	109	132
Veterinary	Q4	105	132
Biochemistry	Q4	290	291
Mathematics	Q4	256	302
Marine	Q4	99	103
Ecology	Q4	121	141

Table III.
Variety of subject categories of Turkish OAJs in JCR

ranked in Q4 (41.2 per cent). However, journals in seven categories were in Q3 (52.9 per cent) and one category was ranked in Q2 (5.9 per cent).

Similar to the Iranian medical journals, most Turkish medical journals were ranked in Q4, although two of them were in Q3 (Figure 7).

Table IV shows the JCR quartile ranks and subject categories for the other four D-8 countries in Table II that published OAJs indexed in both JCR and Scopus. One journal from Pakistan was in Q1 and four other journals were in Q3 and Q4 (two journals each). All journals from Bangladesh, Nigeria and Malaysia were in Q4.

Among the 59 D-8 journals indexed in the JCR (data for one journal were not available), 69.5 per cent (41 titles) were in Q4, 27.1 per cent (16 titles) were in Q3 and 1

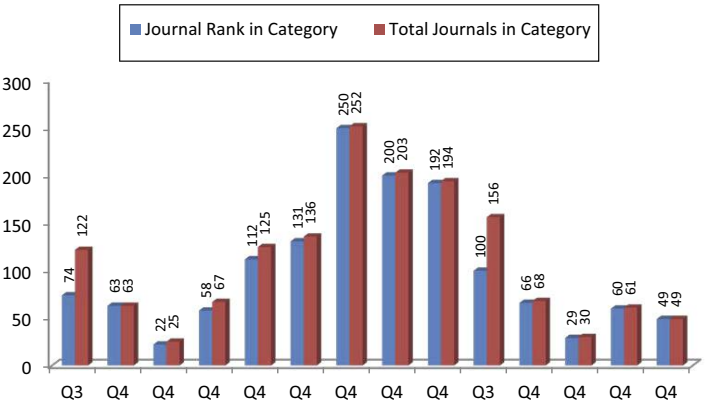


Figure 7.
Quartile ranking of OAJs from Turkey in the JCR medical sciences category

Notes: Numbers at the top of each bar show journal rank (blue bars) and the total number of journals in the category (red bars)

Table IV.
JCR quartile ranking and subject category of OAJs from four D-8 countries

Quartile in category	Journal rank in category	Total journals in category
Pakistan		
Q1 (Veterinary)	32	132
Q3 (Agriculture)	105	199
Q3 (Veterinary)	93	132
Q4 (Medicine)	152	156
Q4 (Medicine)	211	256
Bangladesh		
Q4 (Medicine)	227	256
Q4 (Medicine)	182	199
Nigeria		
Q4 (Medicine)	232	256
Malaysia		
Q4 (Medicine)	191	194

journal each was in Q2 (Geoscience, Turkey) and Q1 (Veterinary Science, Pakistan) (1.7 per cent). It is worth noting that the JIF for journals in Q4 ranked lowest in the subject category.

Metrics, such as the JIF and SNIP, are indicators of journal quality. Sustainable quality is the most important element in the journal publishing process. Scientific communities expect journals to be indexed in abstracting and indexing services as well as citation databases. The Thomson Reuters citation databases operate on a strict journal selection policy. Thus, journal eligibility for indexing in JCR is an indication of journal quality. Egyptian journals registered the highest number of OAJs in DOAJ, and this reflects the appreciable efforts by Egyptian editors to publish more OAJs. The lack of Egyptian journals with a JIF is a drawback, yet, on

the other hand, based on evaluations by Scopus (which also uses a number of selection criteria), the mean SNIP for Egyptian journals is 0.57, which places Egypt at the top of the ranking among D-8 countries.

Year of DOAJ registration

The numbers of D-8 OAJs indexed in DOAJ increased gradually up to 2008 (Figure 8). From 2009 onward, a significant increase in the number of DOAJ-registered journals was observed. The increase peaked in 2013.

Some journals started publishing in OA before the DOAJ was founded in 2003. The authors identified a total of 161 titles of OAJs that were being published by D-8 countries in 2002 or earlier (DOAJ, 2003). The number of journals registered in DOAJ showed a sustained increase after 2003, with the exception of 2012 (Figure 9). The OA movement in scholarly communication is a phenomenon that is growing slowly but steadily. It is rooted in researchers' and journal editors' initial low familiarity with and awareness of OA compared to the subscription-based journal-publishing model, which dates back 350 years. Attitudes toward OA have become increasingly positive over time. Figure 9 illustrates the significant growth in the numbers of D-8 OAJs from 2009 onward.

A major contributor to this growth was the increase in OAJs published in Egypt. The dip in the rising trend in 2012 most likely reflects a transitory decline in D-8 activities aimed at making their journals OA. Egypt, in particular, played a crucial role in the

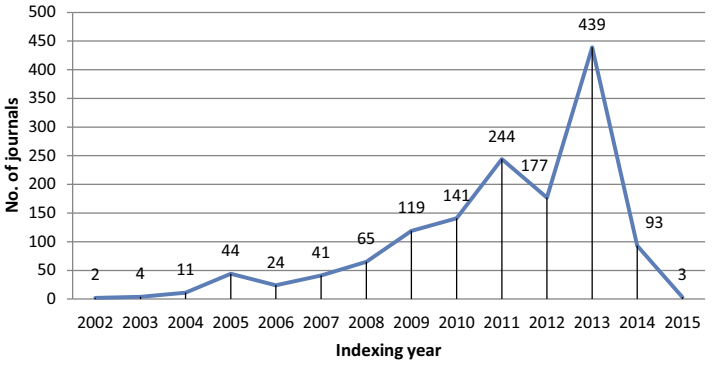


Figure 8.
Number of journals registered per year in DOAJ

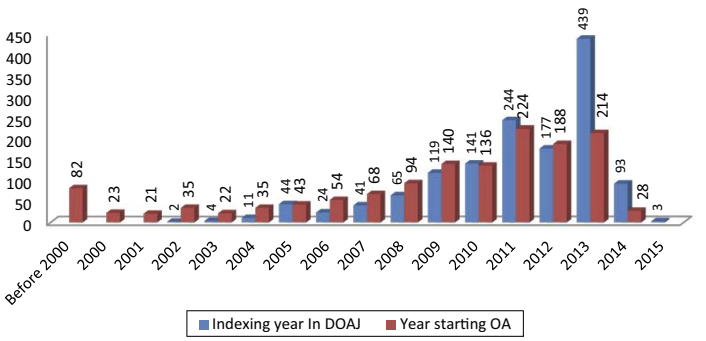


Figure 9.
Numbers of D-8 journals that were OA before the creation of DOAJ and that were registered in DOAJ each year after 2003

sudden decrease in OAJs from 115 in 2011 to 46 in 2012. In 2013, however, most D-8 countries, except for Malaysia and Bangladesh, registered more journals in DOAJ.

Early pioneers of the OA movement hoped to develop a system of barrier-free access to the full text of articles. In Egypt, the earliest OAJ was published in 1874, making this country the OA pioneer in the D-8 group. In other countries, journal content was available openly in Turkey in the 1960s, Indonesia and Malaysia in the 1970s and in Iran and Pakistan in the 1980s, followed by Nigeria and Bangladesh in the early 2000s (Figure 10).

Conclusions

The study incorporated three web-based sources – DOAJ, Thomson Reuters and Scopus – in the examination of 1,407 OAJs published in D-8 countries and indexed in DOAJ between 2000 and 2014. In all, about 13.8 per cent of journals registered in DOAJ are from D-8 states. The share of three countries (Egypt, Iran and Turkey) accounts for approximately three-fourths of all D-8 journals. Free access to journal content and publicly funded research will increase the visibility of research findings and thus readership and ultimately lead to more citations to contributors, journals and countries. Moreover, OA to the scientific literature provides scientists in developing countries with the opportunity to boost their presence in international scientific collaboration networks. Although the authors hope that other countries will move to OA, journal quality control must not be overlooked in this transition. Specifically, OA publications should not bypass peer review and efforts to increase the quantity of information available should be matched by parallel efforts to maintain the quality of what gets published.

As the number of OAJs from D-8 countries increases, their publishers should attempt to make these journals eligible for indexing in-citation databases, such as WoS and Scopus. The findings showed that only 4.3 per cent (60 titles) of OAJs from D-8 countries were indexed in JCR (mean JIF 0.476) and only 25.2 per cent (354 titles) were indexed in Scopus (mean SJR 0.197, mean SNIP 0.418). With regard to quality, 70 per cent of OAJs with a JIF belonged to Q4 based on the journal rank in category. This figure points to a need to strengthen the overall effectiveness of OAJs from these countries.

Licensing agreements are a significant issue for OAJs in the D-8 countries. CC proposes six licenses to share world knowledge. The findings show that more than one-third

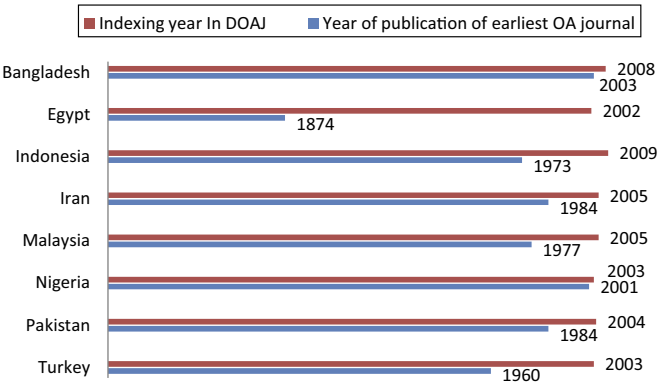


Figure 10.
Time interval between publication of earliest OA journal in each D-8 country and registration in DOAJ after 2003

(38 per cent) of OAJs used a CC-BY license, which is "recommended for maximum dissemination and use of licensed materials" (http://creativecommons.org/licenses/). This choice of license is a hallmark of authors' tendency to make their research findings OA, especially in Egypt.

Thirty years before the DOAJ was created, half of the D-8 countries had already started publishing OAJs. This is clear evidence of the willingness and motivation of researchers from these countries to publish in OAJs. Journal publishers' widespread use of OA models of dissemination will boost the accessibility of journal contents and, ultimately, the impact of research carried out in D-8 countries.

The subject category distribution of OAJs with a JIF showed that medical sciences accounted for 60 per cent of the journals. The difference was significant between medical sciences and all other categories, such as agriculture, veterinary science, engineering and mathematics. This is a finding of note, and it is recommended that editors and publishers of OAJs in other subject categories invest in improving journal quality with a view to increasing the share of D-8 journals from other categories that are indexed in JCR.

Intra-D-8 versus extra-D-8 scientific collaboration is an interesting issue for future study. In this regard, access to journal contents in these countries will play a crucial role in knowledge sharing and technological development. Currently, 121 D-8 journals (including OAJs and non-OAJs) are indexed in JCR. This is important for two reasons. First, all 121 journals have a JIF, which is an indicator of research impact; second, all of these journals are published in English, so every researcher in all D-8 countries can use the contents as long as they are accessible.

References

Ahmed, A. (2007), "Open access towards bridging the digital divide-policies and strategies for developing countries", *Information Technology for Development*, Vol. 13 No. 4, pp. 337-361.

Arunachalam, S. (2003), "Information for research in developing countries: information technology-friend or foe?", *Bulletin of the American Society for Information Science & Technology*, Vol. 29 No. 5, pp. 16-21.

Arunachalam, S. (2008), "Open access to scientific knowledge", *DESIDOC Journal of Library & Information Technology*, Vol. 28 No. 1, pp. 7-14.

Björk, B.C. (2012), "The hybrid model for open access publication of scholarly articles: a failed experiment?", *Journal of the American Society of Information Sciences and Technology*, Vol. 63 No. 8, pp. 1496-1504.

Björk, B.C. and Solomon, D.J. (2015), "Article processing charges in OA journals: relationship between price and quality", *Scientometrics*, Vol. 103 No. 2, pp. 373-385.

Björk, B.C., Welling, P., Laakso, M., Majlender, P., Hedlund, T. and Guðnason, G. (2010), "Open access to the scientific journal literature: situation 2009", *PLoS ONE*, Vol. 5 No. 6, p. 11273.

Bornmann, L., Mutz, R., Neuhaus, C. and Daniel, H.D. (2008), "Citation counts for research evaluation: standards of good practice for analyzing bibliometric data and presenting and interpreting results", *Ethics in Science and Environmental Politics*, Vol. 8 No. 1, pp. 93-102.

Bosch, S. and Henderson, K. (2012), "Coping with the terrible twins: periodicals price survey 2012", *Library Journal*, available at: http://lj.libraryjournal.com/2012/04/funding/coping-with-the-terrible-twins-periodicals-price-survey-2012/ (accessed 18 January 2015).

Chan, L. and Kirsop, B. (2001), "Open archiving opportunities for developing countries: towards equitable distribution of global knowledge", *Ariadne, No*. 30, available at: www.ariadne.ac.uk/issue30/oai-chan/ (accessed 15 May 2015).

Creaser, C., Fry, J., Greenwood, H., Oppenheim, C., Probets, S., Spezia, V. and White, S. (2010), "Authors' awareness and attitudes toward open access repositories", *New Review of Academic Librarianship*, Vol. 16 No. 1, pp. 145-161.

D-8 Organizations for Economic Cooperation (1997), "Brief history of D-8", available at: www.developing8.org (accessed 23 May 2015) .

Davis, P.M. (2011), "Open access, readership, citations: a randomized controlled trial of scientific journal publishing", *The FASEB Journal*, Vol. 25 No. 7, pp. 2129-2134.

De Beer, J.A. (2005), "Open access scholarly communication in South Africa: a role for national information policy in the national system of innovation", Master's thesis, University of Stellenbosch (South Africa), available at: www.jenniferdebeer.net/research/DeBeerJenniferThesisMPhil2004.pdf (accessed 2 December 2014).

Directory of Open Access Repositories - OpenDOAR (2006), available at: www.opendoar.org/index.html (accessed 12 January 2015).

Ennas, G. and Diguardo, M.C. (2015), "Features of top-rated gold open access journals: an analysis of the Scopus database", *Journal of Informetrics*, Vol. 9 No. 1, pp. 79-89.

Gargouri, Y., Larivière, V., Gingras, Y., Carr, L. and Harnad, S. (2012), "Green and gold open access percentages and growth, by discipline", paper presented at 17th International Conference on Science and Technology Indicators (STI), 5-8 September, Montreal, CA, available at: http://eprints.soton.ac.uk/340294/ (accessed 24 March 2015).

Ghane, M.R. (2006), "A survey of open access barriers to scientific information: providing an appropriate pattern for scientific communication in Iran", *The Grey Journal*, Vol. 2 No. 1, pp. 35-42.

Ghosh, S.B. and Das, A.K. (2007), "Open access and institutional repositories – a developing country perspective: a case study of India", *IFLA Journal*, Vol. 33 No. 3, pp. 229-250.

Gómez, N., Bustos-Gonzalez, A., Santillan-Aldana, J. and Arias, O. (2009), "Open access indicators and information society: the Latin American case", *OCLC Systems & Services: International Digital Library Perspectives*, Vol. 25 No. 2, pp. 82-92.

Haider, J. (2007), "Of the rich and the poor and other curious minds: on open access and development", *Aslib Proceedings*, Vol. 59 Nos 4/5, pp. 449-461.

Harjuniemi, M.L. (2012), "Open access survey: the results survey of academic attitudes towards open access and institutional repositories", available at: http://jyx.jyu.fi/dspace/bitstream/handle/123456789/37729/OA-Survey_Results.pdf?sequence=1 (accessed 23 January 2015).

Harnad, S. and Swan, A. (2008), "India, open access, the law of karma and the golden rule", *ESIDOC Journal of Library and Information Technology*, Vol. 28 No. 1, pp. 35-40.

Hernández-Borges, A.A., Cabrera-Rodríguez, R., Montesdeoca-Melián, A., Martínez-Pineda, B., Torres-Álvarez de Arcaya, M.L. and Jiménez-Sosa, A. (2006), "Awareness and attitude of Spanish medical authors to open access publishing and the 'author pays' model", *Journal of the Medical Library Association*, Vol. 94 No. 4, pp. 449-451.

Hess, T., Wigand, R.T., Mann, F. and Von Walter, B. (2007), "Management report 1/2007: open access and science publishing - results of a study on researchers' acceptance and use of open access publishing", available at: www.econbiz.de/archiv1/2010/101264_open_access_publishing.pdf (accessed 25 March 2015).

Hu, D., Huanj, B. and Zhou, W. (2012), "Open access journals in China: the current situation and development strategies", *Serials Review*, Vol. 38 No. 2, pp. 86-92.

Kenneway, M. (2011), "Author attitudes towards open access publishing", available at: www.intechopen.com/public_files/Intech_OA_Apr11.pdf (accessed 23 February 2015).

Kim, H. (2012), "The effect of free access on the diffusion of scholarly ideas", *International Industrial Organization Conference*, George Mason University, Fairfax, VA, 16-18 March, available at: www.google.com/?gws_rd=ssl#q=open+access+affect+the+research+diffusion+and+impact (accessed 23 February 2015).

Kirsop, B. (2008), "Open access to publicly funded research information: the race is on", *ESIDOC Journal of Library Technology*, Vol. 28 No. 1, pp. 41-48.

Kirsop, B., Arunachalam, S. and Chan, L. (2007), "Access to scientific knowledge for sustainable development: options for developing countries", *Ariadne*, No. 52, available at: www.ariadne.ac.uk/issue52/kirsop-et-al/ (accessed 10 April 2015).

Kuchma, I. (2008), "Open access, equity, and strong economy in developing and transition countries: policy perspective", *Serials Review*, Vol. 34 No. 1, pp. 13-20.

Laakso, M. (2014), "Green open access policies of scholarly journal publishers: a study of what, when, and where self-archiving is allowed", *Scientometrics*, Vol. 99 No. 2, pp. 475-492.

Metcalfe, A.S., Esseh, S. and Willinsky, J. (2009), "International development and research capacities: increasing access to African scholarly publishing", *Canadian Journal of Higher Education*, Vol. 39 No. 3, pp. 71-87.

Morrison, H. (2014), "Dramatic growth of open access: December 31, 2013: first open source edition", *The Imaginary Journal of Poetic Economics*, available at: http://poeticeconomics.blogspot.com/2014/01/dramatic-growth-of-open-access-december.html (accessed 24 March 2015).

Odlyzko, A. (2013), "Open access, library and publisher competition, and the evolution of general commerce", available at: http://arxiv.org/abs/1302.1105 (accessed 22 March 2015).

Open Citation Project (OPCIT) (2012), "The open citation project: the effect of open access and downloads ('hits') on citation impact: a bibliography of studies", available at: http://opcit.eprints.org/oacitation-biblio.html (accessed 26 September 2015).

Papin-Ramcharan, J. and Dawe, R.A. (2006), "The other side of the coin for open access publishing: a developing country view", *Libri*, Vol. 56 No. 1, pp. 16-27.

Registry of Open Access Repositories - ROAR (2003), available at: www.roar.eprints.org (accessed 10 March 2015).

Rowlands, I., Nicholas, D. and Huntington, P. (2004), "Scholarly communication in the digital environment: what do authors want? Findings of an international survey of author opinion: project report", available at: www.ucl.ac.uk/ciber/ciber-pa-report.pdf (accessed 10 January 2015).

Shin, E.J. (2012), "Scholarly journal publishing and open access in South Korea", *Serials Review*, Vol. 38 No. 2, pp. 99-104.

Smart, P. (2003), "E-journals: developing country access survey", *Learned Publishing*, Vol. 16 No. 2, pp. 143-148.

Smart, P. (2004), "Two-way traffic: information exchange between the developing and developed world", *Serials*, Vol. 17 No. 2, pp. 183-187.

Solomon, D.J. and Björk, B.C. (2012), "A study of open access journals using article processing charges", *Journal of the American Society for Information Science and Technology*, Vol. 63 No. 8, pp. 1485-1495.

Solomon, D.J., Laakso, M. and Björk, B.C. (2013), "A longitudinal comparison of citation rates and growth among open access journals", *Journal of Infometrics*, Vol. 7 No. 3, pp. 642-650.

Suber, P. (2012), "Open access", MIT Press Essential Knowledge Series, MIT, available at: http://cyber.law.harvard.edu/hoap/Open_Access_%28the_book%29 (accessed 12 March 2015).

Swan, A. (2010), "The open access citation advantage: studies and results to date", available at: http://eprints.soton.ac.uk/268516/2/Citation_advantage_paper.pdf (access 11 January 2015).

Swan, A. and Brown, S. (2004), "JISC/OSI journal authors survey report", available at: www.jisc.ac.uk/uploaded_documents/JISCOAreport1.pdf (accessed 5 September 2015).

Swan, A. and Brown, S. (2005), "Open access self-archiving: an author study", available at: http://eprints.ecs.soton.ac.uk/10999/1/jisc2.pdf (accessed 28 February 2015).

Swan, A. and Brown, S. (2007), "Researcher awareness and access to open access content through libraries: a study for the JISC scholarly communications group", available at: http://eprints.ecs.soton.ac.uk/14412/ (accessed 15 February 2015).

Togia, A. and Korobi, S. (2014), "Attitudes towards open access: a meta-synthesis of the empirical literature", available at: elpub.scix.net/data/works/att/102_elpub2014.content.pdf (accessed 26 January 2015).

Van de Sompel, H., Payette, S., Erickson, J., Lagoze, C. and Warner, S. (2004), "Rethinking scholarly communication: building the system that scholars deserve", *D-Lib Magazine*, Vol. 10 No. 9.

Van Noorden, R. (2013), "Open access: the true cost of science publishing", *Nature News*, Vol. 295 No. 7442, pp. 426-429.

Van Rooyen, C. (2014), "Learned societies attitudes toward open access: report on survey results", available at: www.edp-open.org/images/stories/doc/EDP_Society_Survey_May_2014_FINAL.pdf (accessed 5 December 2014).

Wagner, A.B. (2010), "Open access citation advantage: an annotated bibliography", *Issues in Science and Technology Librarianship*, Vol. 60, available at: www.istl.org/10-winter/article2.html (accessed 18 December 2014).

Ware, M. and Mabe, M. (2012), "The STM report: an overview of scientific and scholarly journal publishing", available at: www.stm-assoc.org/2012_12_11_STM_Report_2012.pdf (accessed 17 June 2015).

Further reading

Directory of Open Access Journals (DOAJ) (2003), available at: http://doaj.org (accessed 27 February 2015).

Swan, A. (2008), "Open access for Indian scholarship", *DESIDOC Journal of Library and Information Technology*, Vol. 28 No. 1, pp. 15-24.

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