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## **Scholarly communication and open access: perspectives from Korea**

### **Abstract**

This article reports on scholarly communication and open access in Korea. Drawing on a range of databases, articles and reference sources, it provides unique insights. In contrast to the UK/USA model of scholarly communication, in Korea most scholarly journals are published by discipline-based scholarly societies and research institutes affiliated to universities. Payment for publication is the norm, and typically features APCs and scholarly society membership fees for both open access and toll access journals. Online access to journals in Korea is provided by commercial vendors, who contract with the scholarly societies for exclusive use. Three online access models apply: toll access, gold open access and dual access, with the use of these models varying between disciplines. In parallel with this access provided by commercial vendors, there are a number of government funded open access repositories to which university researchers are requested to deposit their research outputs, as well as open access repositories run by universities and other research institutes.

### **Introduction**

Open access to the findings of scholarly research is a growing international movement, grounded on the principle that publically funded research should be freely accessible online, immediately after publication. In addition, amongst the aspirations for open access is that it would lessen the strength of the commercial publishers, in particular, their capacity to generate further revenues through ever-increasing journal prices (Satyanarayana, 2013). Open access was viewed as a route to increasing access to research findings, whilst also increasing the visibility of research. In particular, in less developed countries, and other countries such as Korea and India that are investing in developing research cultures and expertise, it was expected to enhance access to scholarly resources, enhance research infrastructure, and facilitate an erosion of the divide between local and global journals (Mukherjee, 2014). It would seem that there is still a long road to travel before this can be delivered for developed and developing countries alike. Specifically, in the context of developing countries, analysis of involvement on a country basis through examination of the Directory of Open Access Repositories (DOAR) and the Directory of Open Access Journals (DOAJ) suggests that there are many countries where involvement in open access initiatives remains limited (e.g. Sahu & Arya, 2013). Furthermore, with the exception of India and Nigeria (which use English language for some of their scholarly communication, thereby navigating any potential language barriers to more global scholarly communication), there has been very limited research into open access initiatives, policies and challenges in countries other than the UK and the US. However, there is evidence to suggest that research funding and infrastructure, together with scholarly communications and publishing traditions may have a significant influence on the engagement with and impact of open access initiatives. In addition, it is acknowledged that open access is a disruptive innovation (Lewis, 2012), which is likely to herald significant shifts in the ecology of scientific communication (Jubb, 2013).

With the aim of further investigating the development of open access in different countries, this article undertakes a critical analysis of open access in South Korea. South Korea is an Asian country that has aspirations to enhance its research and its economic development. It has a GDP ranking 13<sup>th</sup> in the world (International Monetary Fund, 2014), and spent 4.15% of its GDP on research and development, which compares very favourably with research and development expenditure in the UK (1.6% of GDP) and US (2.81% of GDP) in 2012 (World Bank, 2016).

This article examines initiatives associated with open access used in Korea. This includes open access repositories, managed by research bodies and the national library, toll access or gold open access journals, and ‘dual open access’. Korea shares with the western world the notion of open access repositories, in which authors ‘self-archive’ unpublished articles or reports into institutional or research funder open access repositories. Korea also has gold open access journals, where the content is free to access on the journal website immediately on publication; an article processing charge (APC) is paid for publication (Crawford, 2015; Solomon & Bjork, 2012), although the arrangements for payment are slightly more complex in Korea than in the western world. The western models of green open access and hybrid open access, do not apply in Korea. In the western model, green OA is where either a subscription or OA journal allows its articles to be placed and made available in OA repositories. For subscription journals, the version made available through the repository is a pre-publication version. Hybrid OA is where a subscription (toll access) journal allows authors to choose whether their article is published OA, leading to a situation in which some articles are free to access (gold OA) and others are toll access. Typically, toll access journals have an embargo period after which they become free to access. In Korea, there are no green OA journals with an embargo, or hybrid OA journals. Instead, there are both open access and toll access journals and both require payment of an APC. Journals in both of these categories are ultimately available for free access via open access repositories and under toll/subscription access via commercial database providers. We term this approach as ‘dual access (DA)’

The aim of this study is, then, to contribute to knowledge on open access models adopted in different contexts, and to thereby complement the significant literature on ‘western’ open access models, and to advance understanding of the challenges associated with global open access. More specifically, the objectives of this study are to:

1. Profile scholarly communication in South Korea
2. Investigate open access journal publishing (OAP) in South Korea.
3. Identify and describe the major open access repositories in South Korea
4. Discuss the open access model adopted in Korea, and compare it with the ‘western model’ of open access.

The next section of this article briefly outlines the method adopted in this research. Then the approach to scholarly communication in South Korea is reviewed in two core sections:(1) scholarly journals and open access publishing in Korea, and (2) open access repositories and green OA. A discussion section compares OA in Korea with the ‘western’ model of OA,

focusing on types of OA access, intellectual property rights, APCs and other payments, stakeholder groups, and disciplinary differences and similarities. The article concludes with recommendations for practice and policy.

## **Method**

In drawing a profile of open access in Korea, this article draws on a range of secondary sources and databases. This, for instance, involved identifying and inspecting the data available on the websites of the seven major open access repositories in Korea and drawing on statistics produced by KCI Korean Journal Database and other sources such as the websites of OAK Central, KoreaMed Synapse, ScienceCentral, and dCollection. In addition, the article is informed by extracts from previous work by one of the authors previously only published in Korean (e.g. Table 2).

## **Findings**

### ***Scholarly journals and open access publishing in Korea***

#### *Scholarly publishing in Korea*

According to statistics provided in association with the Korea Citation Index (KCI), in 2016 there were around 8,600 academic organizations in Korea, of which 3,441 are scholarly societies and 5,047 are research institutions affiliated to universities (<https://www.kci.go.kr/kciportal/po/statistics/poStatisticsMain.kci>). Between them, these organizations are responsible for producing numerous research journals, as shown in Table 1. Over half of these journals are listed in the KCI, and benefit from the quality endorsement that this offers. In humanities and social sciences (HSS) 44% of the total are included in KCI, whilst in science, technology and medicine (STM) 39% of the total are included. Many of the journals listed in KCI are published by scholarly societies, specifically, 74% in HSS and 96% in STM.

#### *Insert Table 1*

In order to understand open access publishing in Korea it is necessary to understand the scholarly publishing process (Kim, 2014; Woo 2010; Lee 2005; Joung 2011). (Figure 1). Researchers submit articles to scholarly societies, who are responsible for peer review, publication decisions, proofreading, and, sometimes, editorial design and printing. Articles are then deposited and made available through either: one of the main OARs (e.g. KCI repository); societies' websites; academic libraries through a licensing arrangement that involves commercial database providers; or, through sales to individuals.

This model of scholarly publishing leads to three types of online access to Korean journal articles, toll access (TA), gold open access (OA), and dual access (DA). Toll access (TA) is

fee-based, involving commercial vendors providing online access to articles to individuals for a fee, and to libraries by a licensing agreement. The model is based on full journals, and access is through the commercial database providers' services. The commercial vendors (two major vendors (Nurimedia and Korean Studies Information (KSI) and three minor vendors (Kyobo Book Center, earticle.net and Hakijisa Corporation)) contract with scholarly societies (the publisher) for exclusive use, and pay royalties to the societies according to article usage. The second approach, Gold open access (OA) offers free access to journal articles to the public through information service institutions (typically government funded research and information institutes, such as KISTI), and through the websites of some scholarly societies. Scholarly societies receive support from the research and information service institutions to enable them to provide free online access to their journal articles. Under the third approach, dual access (DA), journals can be accessed free by the public through the scholarly societies' websites and/or open access repositories, whilst also being available through commercial vendor's databases, where, typically, individuals pay a fee, or access the journals through their university library, which has taken out a license with a vendor.

*Insert Figure 1*

According to Joung (2011), 34% of KCI journals were TA, 34% were DA, 22% were OA, and for 10% the status could not be determined due to lack of information provided. The main reason why publishers are prepared to offer their journal as open access is that it enhances the citation rate, and thereby the ranking and reputation of the journal. As Table 1 shows, the distributions between OA, DA and TA differs significantly between fields, with a significantly larger proportion of STM as opposed to HSS journals being open access; engagement with OA in medicine and agriculture is particularly high. These differences may be influenced by the existence of OARs in some disciplines, such as the Society Village for Science and Technology, managed by KISTI (Korea Institute of Science and Technology Information) and KoreaMed Synapse managed by KAMJE (Korean Association of Medical Journal Editors), covering STM and medicine, respectively. OARs are discussed further in the next section. Certainly, the percentage of DA journals in agriculture is much higher than in other fields, probably due to the absence of a significant OA repository in this field.

*Insert Table 1*

*Gratis, libre and intellectual property rights.*

The license for OA journals is usually for access only, and does not grant permission to reuse, such as in reproduction or transmission to the public. This OA is gratis OA, relating to the removal of price barriers only, according to Harnard's terminology (Suber 2008). Very few journals declare an open access policy or adopt an open access or Creative Commons License. This is in keeping with the tradition in Korean scholarly publication, in which the intellectual property rights for an article typically remain with the author. For example, according to Hong

(2008) only 35 of the 906 KCI journals in 2007 regulated the author's rights regarding their article. Furthermore, for 66.2% of the journals no copyright information was provided, suggesting a laissez-faire approach to intellectual property rights. There is some evidence that, with the advent of OA initiatives, this situation is changing. The number of libre OA journals (involving the removal of price and at least some permission barriers (Suber (2008)) is increasing slowly, although there are clear differences between disciplines. For instance in medicine, according to the data from the KoreaMed website (47.6%) of KoreaMed member journals use the CC-BY NC license. On the other hand, amongst the journals published by research institutes affiliated to universities, only 8 of 296 KCI journals have adopted a Creative Commons Licence (CCL), even though 98.2% of the journals are open to the public (Son 2014). Most of these journals are in the humanities and social sciences. Also, according to a recent report, only 13% of KCI journals had adopted CCL (National Library of Korea, 2015).

#### *Publishers of OA journals and income sources*

Table 2 shows that most of the highly regarded journals, i.e. those listed in KCI, are published by scholarly societies. In addition, most open access journals in Korea also were published by societies. According to Joung's research (2011), 76% of OA journals were published by societies, 13% by research institutes affiliated to universities and 11% by research institutions funded from government or non-commercial research organizations. Recent research (Son, 2014) on the KCI journals published by university research institutes showed that 85.8% were DA journals, 9.4% were OA, and 4.72% were TA.

Given that many journal publishers are scholarly societies or research institutes in universities who are keen to both generate income from their journal publishing activities and to build their viability and reputation in the research field, income from OA journals is a very important issue. There are various income sources including APCs, advertisement revenue, membership fees, and grants from the government or from research funding agencies. One of the most contentious aspects of any open access model are article processing charges (APCs). APCs are a charge for publication, and are paid by the author, their research funder or research institution. As shown in Table 3, 84.4% of the KCI OA journals in 2010 had an APC (Joung 2010) and 90.6% of the journals had membership fees, of between £5 and £40. Annual membership fees are payable to academic societies and support the activities and management of those societies, including their publishing activities. Only members can submit to the journals published by these societies. 68.8% of journals received journal publication subsidies from a funding institution (either from the National Research Foundation or from KOFST). In addition, some journals have some advertising revenue (45.3%), and others require a higher APC for funded articles and/or a board member fee (the fee associated with a special type of society membership), in addition to the membership fee, when academics join the society.

*Insert Table 2*

### *Insert Table 3*

APCs vary significantly, from a minimum of £0.88 to a maximum of £44 (Joung 2010). This diversity is also evident with DOAJ journals, for which the APC range was between \$8 and \$3,900 (Solomon & Björk 2012). In further analysis, which compares APCs for OA and TA journals, Joung (2010) shows that whilst APCs are paid in both of these categories, fees for OA articles are generally higher than those for TA articles. For some articles, an ‘APC for funded article’ was added to the basic APC; this was typically between £30 and £117.

### ***Open access repositories and Green OA***

#### *Overview*

In common with other countries, in parallel with open access initiatives associated with OAP, Korea has a number of open access repositories, through which journal articles and other research outputs, such as theses and research reports can be accessed. 35 repositories in Korea are registered in ROAR (Registry of Open Access Repositories) (March 2016 [http://roar.eprints.org/cgi/roar\\_search/advanced?location\\_country=kr&software=&type=&order=-recordcount%2F-date](http://roar.eprints.org/cgi/roar_search/advanced?location_country=kr&software=&type=&order=-recordcount%2F-date)) and 28 repositories with openDOAR) (the Directory of Open Access Repositories) (March 2016 <http://www.openoar.org/countrylist.php?cContinent=Asia>). However, there are no OA mandates or policies that are registered in ROARMAP (Registry of Open Access Repository), although researchers whose research is funded by government and similar sources are under a mandate to submit their outputs to KCI. KCI is an open access repository, such that when researcher submit their articles, they will be freely available through the KCI website.

### *Insert Table 4*

Table 4 shows the most important OARs in Korea. All except KoreaMed Synapse are government funded initiatives. Each has a management agency, that is either a research funding agency (such as NRF), a research and information institute which provides research and information services, and in some cases research funding, or the National Library of Korea. In addition to these OARs, many universities and research institutes have OARs. Twenty-six universities use the OAK software, and provide access to their OARs through OAK Portal. Some OARs include only journals (whole journals), whilst others include individual articles, theses, and documents in other formats. The OARs in Table 3 can be divided into three groups: multi-disciplinary OARs, discipline-specific OARs, and institutional repositories, which are also typically multi-disciplinary.

#### *Multi-disciplinary OARs*

The KCI repository is an open access repository managed by the NRF (National Research Foundation, <http://www.nrf.re.kr>). It is the biggest government research funding and journal

evaluation institution in Korea. Since 2007, according to government mandate (Ministry of Education, Science and Technology), all published articles generated by research funded by NRF must be submitted to NRF and stored in the KCI repository (Kim 2013). In addition, this repository will accept deposits from scholarly societies. 34.0% (36.3% in STM, 33.0% in HSS) of the KCI-indexed journals are deposited in this repository (March 2016, <https://www.kci.go.kr/kciportal/po/search/poArtiTextSear.kci>).

As a result of the adoption of an OA policy by NRF in 2013, coupled with NRF's development of JAMS (Journal & Article Management System) and grant of permission to use the system to the societies (from 2012), and the option for authors to adopt CCL (from 2013), the number of journals in KCI repository has increased significantly in recent years.

Operated by the National Library of Korea, OAK Central is an open access journal archive based on JATS (Journal Article Tag Suite) XML, which supports the inclusion of full text, tables, and figures in articles. Whilst its coverage is limited, its use of XML is important. Journals are selected by the National Library of Korea and converted into JATS XML and archived in OAK Central (March 2016, <http://central.oak.go.kr/>).

#### *Discipline-specific OARs*

Society Village for Science and Technology is an open access archive for the field of science and technology, which has been managed by KISTI (Korea Institute of Science and Technology Information) since 1997. KISTI is the government's main information service institution for science and technology. Their objective is to archive and open to the public journal full text in collaboration with scholarly society publishers. Unlike, KoreaMed Synapse and KCI, there are no criteria for inclusion, and therefore, there is no quality control, and hence there are many journals and non-academic magazines in this archive; this is the largest OAR in Korea. Some journals in this archive may use a CC-by NC licence, but there is no information available on the extent of use (March 2016, <http://society.kisti.re.kr/>).

KoreaMed Synapse is journal archive covering medicine. Journals included are published in English; most are deposited by members of KAMJE (Korean Association of Medical Journal Editors). All journals adopt CC-BY NC license, and unlike in KCI, PMC XML is applied to all articles (March 2016, <http://synapse.koreamed.org/>).

Managed by KOFTS (Korean Federation of Science and Technology Societies), ScienceCentral is a recent initiative for journal archiving in science and technology. The criteria to be archived in this repository are: open access journal either using a CC license or simply providing free access; full text access with no embargo period; a peer view process; and the publisher must be a non-profit organization. KOFTS offers financial support for societies to convert the journal full text into JATS XML (March 2016, <http://www.e-sciencecentral.org/>).

#### *Institutional repositories*



dCollection is the archive for 240 university open access repositories. It is relatively long-standing, having been in existence since 2003 and is run by KERIS (Korea Education and Research Information Service). The main content of this OAR are theses, which are required to be available under a CC license. This repository has 337,411 journal articles (20% of the total documents), 1,323,225 theses, 771 research reports, and 23,165 other items. Academic staff are not mandated/required to submit articles to the archive, although there has been a recent initiative from KERIS to encourage the archiving of journals published by research institutes affiliated to universities (March 2016, <http://www.dcollection.net/search/main.do>).

The OAK Portal provides access to the contents of the 26 repositories in Korea, most of which are registered in ROAR or ROARMAP. These repositories include 11 universities, 12 research institutions, 2 libraries, and 1 public cooperation. OAK Portal is one of the results of the government open access project in 2009, which developed open access repository platforms based on Dspace SW and provided this to selected non-profit organizations. Therefore, OAK Portal provides access to a variety of contents, including articles, theses, and research reports (March 2016, <http://www.oak.go.kr/main/main.do>).

## **Discussion**

### ***Overview***

In keeping with its aspirations and investment towards the development of its research capacity, there has been considerable interest in the development of open access initiatives in South Korea over the past decade. These initiatives include those concerned with open access journal publication and with open access repositories. These developments pose some of the same challenges for Korea as they pose for western economies, in terms, for instance, of tensions regarding the role of commercial publishers and database providers, issues associated with the shifting economics of scholarly publishing, and concerns regarding intellectual property rights. However, these issues have been and will continue to be worked out against the backdrop of the rather different tradition of scholarly publishing in Korea. This section discusses some of the unique features of the open access model in Korea, comparing it with the more widespread model in the UK and the USA. In general, key stakeholder groups are consistent across contexts, but their precise roles and the way in which they interact may vary. In addition, there is some commonality regarding the models of OA adopted in different countries, but the precise nature of these and their relative importance varies. Intellectual property rights and their protection, alongside payments and funding for open access initiatives are two other themes that recur. Finally, disciplinary differences are broadly consistent with those in western economies.

### ***Stakeholder groups***

Scholarly societies have a significant tradition of involvement in scholarly publishing, seeing academic journals as important for their reputation and the development of their discipline/profession, as well as offering an income stream, and a benefit to their members. However, Solomon (2013), found that for Scopus journals, only 26.4% of OA journals were published by a society publisher and 23.6% by university publisher. This is much lower than is the case in Korea. This is quite probably because in western economies, many scholarly societies have, in recent decades, outsourced the publishing processes associated with their journals to commercial publishers. These commercial publishers, under a license, take responsibility for managing the interface with authors, including managing a manuscript submission system, liaising with or appointing journal editors, copyediting, and other production processes. In Korea, these processes are still mainly performed by scholarly societies. As such, they potentially have a more direct influence on open access processes and policies. On the other hand, as a disparate group of organizations, they may find it more difficult to make their voices heard, and to achieve the impact on open access approaches that major publishers can exert in western economies. Both the government and the database providers are keen to work with societies, and acknowledge their pivotal role in open access initiatives.

Governments, and more specifically their research funding agencies, have increasingly extended their role in research policy to dissemination of research outputs. However, in the early stages of open access in western economies, open access was very much seen as an ideological stance, supported by researchers, themselves, and driven by the belief that the outputs of publically funded research should be open to all (Crawford, 2015). It is only relatively recently that research funding agencies in, for example, the US and the UK, have started to fund the publication of research outputs through paying for APCs and to mandate open access publication. This has led to commercial publishers offering a gold open access route for the publication of articles in their previously subscription only access journals. Whilst in both Korea and many 'western economies, governments and their agencies have supported OARs and OAP, the Korean government involvement in OA is unusually high. The significant increase in the number of open access journals in recent years has been facilitated by the adoption of an OA policy by NRF in 2013, NRF's development of JAMS (Journal & Article Management System) and grant of permission to use the system to the societies (from 2012), and the option for authors to adopt CCL (from 2013). In western economies, in addition to government investment, there has been input from publishers and other commercial interests into such developments.

Research into open access in western economies has also explored the attitudes of academics, in their roles of author, reviewer and editor. This research indicates that: funding and perceived quality are the main barriers to publishing in open access journals (Dallmeier-Tiessen et al., 2011); researchers are confused and suspicious about open access (Nicholas et al., 2014); and, there is some negativity towards the use of repositories (Jamali et al., 2014). No parallel research on researchers' attitudes has been conducted in Korea, but the availability of funds to

support open access publication as part of research funding for a specific project, may mean that funding is less of an issue (although there may be disciplinary differences). Furthermore, the embeddedness of the scholarly societies in the publication process may allay any potential concerns regarding quality. The other key stakeholder group is university libraries, who typically are more likely to be engaged with OARs than OAP. In both Korea and western economies, such institutional repositories are used more for theses deposit than for staff research. In Korea individual university repositories contribute to the dCollection archive.

### ***Types of OA access***

All of the documents deposited in OARs managed by the research and information institutions and research funders, are available through green open access. This will mainly be theses and reports, but include some articles available under toll access, from commercial database providers or societies. However, since to achieve publication in Korea, virtually all articles are subject to some kind of fee, there is no parallel to the green open access model that has been developed by subscription journal publishers in the West in recent years. Hence embargo periods do not exist. The other main type of access is dual access, a variation on the ‘western model’ for hybrid access. Dual access journals are those that can be accessed through commercial vendors (under, say, a license with a university library i.e. not open access, but toll access) or through one of the OA repositories, or society websites. This dual access model, is, however, inherently unstable, since commercial database providers are actively lobbying for sole rights of distribution, but does have the effect of moderating the level of APC charged.

### ***Intellectual property rights***

In Korea, most journals are still published by scholarly societies. Traditionally, they have adopted a *laissez faire* attitude towards intellectual property rights and their transfer, typically leaving copyright with the author. However, more recently, there has been a move towards societies requesting copyright transfer from authors, since this is necessary for their licensing arrangements with the commercial database providers. Creative Commons licenses are not widely adopted, although their use is well-established in medicine.

### ***APCs and other payments***

APCs are not new to scholarly publishing in Korea. Scholarly societies have always charged APCs (arguably similar to page charges) for publication in their journals. However, APCs for open access journals are higher than those for toll access journals, although there are significant differences by discipline. The issue of APCs and their level is pivotal, not only in determining which researchers can afford to publish, but also in determining the revenue of publishers, and in turn, their long-term viability. In western economies, there is evidence of significant differences in access to grant funding for APCs, with a divide between STM and HSS (Solomon & Björk, 2012; Dallmeier-Tiessen et al., 2011). For Korea, there is evidence that APCs are lower in HSS than in STM, which is most likely a result of the level of funding available (Joung 2012). It is difficult to compare levels of APCs between Korea and other

countries, partly because in addition to APCs, scholarly societies in Korea also charge other supplementary fees, such as a membership fee. Nevertheless, in both this study and that of Solomon & Björk (2012) there is a wide APC range, and fees are typically considerably lower than those charged by western OA journals, which are often around \$2000.

### ***Disciplinary differences and similarities***

There are many more HSS journals than there are STM journals published in Korea (Table 2), and more than twice as many HSS journals approved and listed by KCI than STM journals. Furthermore, a relatively high percentage of the STM journals are published by scholarly societies compared with HSS journals where more are published by the universities. Furthermore, in 2011, a much smaller percentage of HSS journals were available as gold open access than was the case with STM journals, and there is a much higher level of toll access for HSS journals, than there is for STM journals (see Table 1). This may be linked to funding availability, or to the availability of OARs in science and technology (KISTI) and medicine (KoreaMed). Such differences are consistent with those found in studies in western economies.

## **Conclusion**

### ***Summary***

By examining open access initiatives in Korea, including both OAP and OARs this article offers a holistic perspective on progress with open access in a country that is committed to the development of a model of scholarly communication, which includes a significant open access element. This study offers some insights into the dynamic between scholarly communication which may, potentially, inform progress both in western economies and in other less developed nations. Specifically, Korea shares many of the core characteristics of open access in other countries, *viz*, the key stakeholder groups, types of open access, approaches to managing intellectual property rights, APCs and other funding issues, and disciplinary differences and disparities, but in each of these areas there are nuances that are specific to Korea.

### ***Recommendations for practice/policy***

As discussed above, in Korea, as elsewhere, there are a number of stakeholder groups involved with OAP and OARs. Compared with the ‘western’ open access model, in Korea, government bodies and scholarly societies have been relatively proactive in promoting and funding open access models. This means that the sustainability of the current model, including both OAP and OARs is pivotally dependent on the level of continued government funding. Indeed, extension to embrace a greater number of journals will require additional government funding. As such, it is important that government bodies, working with other stakeholders, continue to review their long-term aspirations in relation to open access. Further, since open access constitutes a paradigm change, all parties need to work together to build a sustainable model of open access scholarly publishing, that includes both OAP and OARs.

More specifically, policy or management decisions will be required in the following areas:

1. The dual access model is inherently unstable, such that policy decisions need to be made regarding its long term sustainability
2. There is a need for further developments in the formalization of intellectual property rights.
3. Although, currently, in Korea, the level of APCs do not present a problem for researchers, relatively low APCs do pose a threat to the sustainability and viability of society publishers. This situation needs to be monitored, in order to inform policy decisions.
4. The differences in the OAP profiles of disciplines is evidence of the role of university investment in the dissemination of scholarly outputs. This role would benefit from further examination, with particular reference to the role that universities and their libraries can play in OARs.

### ***Limitations and further research***

Examining the global landscape of open access is complex. This article makes a modest contribution towards this endeavor. Further studies in other countries in the world, with at least some emphasis on countries where the language of scholarly communication is not English are required, as a basis for achieving improved access to research outputs for scholars and professionals in less developed countries.

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## Figure and Tables

Figure 1: Processing of publishing and access routes to articles

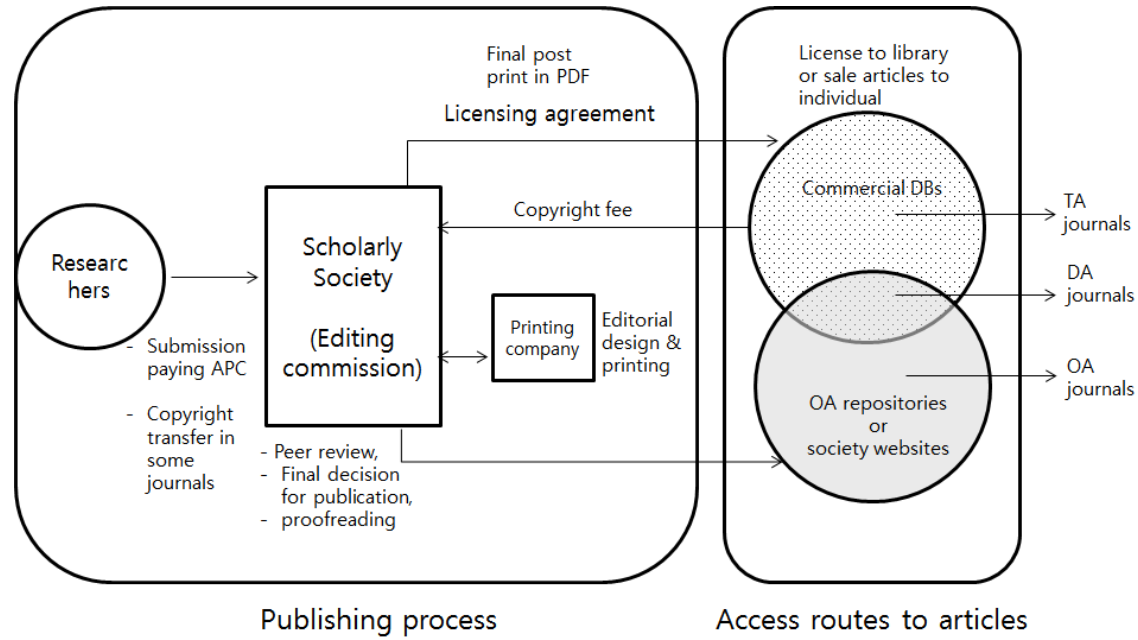


Table 1: Types of online access to Korean journals by discipline(Joung 2011) (extracted May-June 2011)

Discipline Types of journal	Humanities & Social Sciences (HSS)				Science, Technology & Medicine (STM)				Total
	Humanities	Social sciences	Arts	Multi-disciplinary	Science	Technology	Med. & Pharm.	Agri. & Oceano.	
KCI journals	382	468	62	41	85	180	152	68	1,438
TA journal (%)	173 (45)	211 (45)	38 (61)	17 (41)	7 (8)	28 (16)	11 (7)	9 (13)	494 (34)
DA journal (%)	132 (35)	124 (26)	7 (11)	14 (34)	42 (49)	89 (49)	39 (26)	44 (65)	491 (34)
OA journal (%)	50 (13)	76 (16)	6 (10)	4 (10)	28 (33)	44 (24)	90 (59)	11 (16)	309 (22)
Other	27 (7)	57 (12)	11 (18)	6 (15)	8 (9)	19 (11)	12 (8)	4 (6)	144 (10)

Table 2: Distribution of scholarly journals by KCI listing and discipline (extracted April 2016)

Discipline		Humanities & Social Sciences (HSS)					Science, Technology & Medicine (STM)					Total
		Humanities	Social sciences	Arts	Multi-disciplinary	Subtotal	Science	Technology	Med. & Pharm.	Agri. & Oceano.	Subtotal	
Journal & Publisher												
All journals	Society	586	868	188	111	1,753	159	359	362	86	966	2,179
	*Univ.	504	829	149	73	1,555	225	288	162	59	734	2,289
	Other	20	68	5	7	100	10	7	3	3	23	123
	Subtotal	1,110	1,765	342	191	3,408	394	654	527	148	1,723	5,131
Journals indexed in KCI	Society	397	560	104	58	1,119	112	223	243	65	643	1,762
	*Univ.	135	166	9	17	327	3	2	5	4	14	341
	Other	13	40	4	3	60	6	2	2	2	12	72
	Subtotal	545	766	117	78	1,506	121	227	250	71	669	2,175

\* Research institutions affiliated to universities (<https://www.kci.go.kr/kciportal/po/statistics/poStatisticsMain.kci>)

Table 3: Income sources for OA & TA Journals (Joung 2010) (extracted July 2010)

		income sources					
		yes	no	APC	*APC for funded article	subsidies from research funding institution	advertising income
OA	Yes	54(84.4)	12(18.8)	44(68.8)	29(45.3)	58(90.6)	8(12.5)
	No	10(15.6)	52(81.3)	18(28.1)	32(50.0)	6(9.4)	56(87.5)
	no response	-	-	2(3.1)	3(4.7)	-	-
	Total	64(100)	64(100)	64(100)	64(100)	64(100)	64(100)
TA	Yes	119(95.2)	99(79.2)	105(84.0)	33(26.4)	114(91.2)	24(19.2%)
	No	6(4.8)	26(20.8)	15(12.0)	89(71.2)	11(8.8)	101(80.8)
	no response	-	-	5(4.0)	3(2.4)	-	-
	Total	125(100)	125(100)	125(100)	125(100)	125(100)	125(100)

\*APC for funded article: APC for articles where the author(s) received grant funding to support the research.

Table 4: Major open access repositories in Korea (March 2016) (extracted March 2016)

	Name of repository	Number of articles	+Date of OA	Contents	URL
Multi-disciplinary OARs	KCI	453,131	2013	Whole journal and individual article	www.kci.go.kr
	OAK Central	9,775	2010	Whole journal	Central.oak.go.kr
Discipline specific OARs	Society Village for Sci. & Tech.	756,974	1997	Whole journal	Society.kisit.re.kr
	KoreaMed Synapse	77,711	2007	Whole journal	Synapse.koreamed.org
	ScienceCentral	13,051	2014	Whole journal	www.e-sciencecentral.org
Institutional repositories	dCollection	337,411*	2003	Articles, thesis	www.dcollection.net
	OAK Portal	257,267*	2010	Articles, thesis, books, research reports	www.oak.go.kr

\*Articles only; excludes other types of content

+ Year when the repository was opened to the public

