A Survey of the Scholarly Journals Using Open Journal Systems

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Abstract

A survey of 998 scholarly journals that use Open Journal Systems (OJS), an open source journal software platform, captures the characteristics of an emerging class of scholar-publisher open access journals. The journals in the sample follow traditional norms for peer-reviewing, acceptance rates, and disciplinary focus, but as a group are distinguished by the number that offer open access to their content, growth rates in new titles, participation rates from developing countries, and extremely low operating budgets. The survey also documents the limited degree to which open source software can alter a field of communication, for OJS appears to have created a third path, dedicated to maximizing access to research and scholarship, as an alternative to traditional scholarly society and commercial publishing routes.

Keywords

Online publishing; Journal survey; Open source software; Open access

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Introduction

Open Journal Systems (OJS) is an online journal management and publishing platform that was first launched in 2002 as open source software freely distributed by the Public Knowledge Project (Willinsky, 2005).[1] The software had been developed as part of the Public Knowledge Project's research program at the University of British Columbia (UBC) in Vancouver, Canada, under the direction of John Willinsky, with subsequent participation by Simon Fraser University Library, the Canadian Centre for Studies in Publishing, and Stanford University. OJS was originally programmed by undergraduate computer science students at UBC, led by Kevin Jamieson, with a research grant from the Social Sciences and Humanities Research Council of Canada that sought to explore the feasibility and consequences of helping print journals to publish their content online.

OJS was designed to manage the journal's workflow, from manuscript submission through review to editorial work and then publication, while offering a ready means of publishing an online edition and better managing the journal's operating costs (Willinsky, 2006). This system was developed within a climate of concern among journal editors and staff over the costs and means of moving from print to online editions, as well as over the viability of open access models (by which, for example, authors make articles freely available through online institutional repositories and journals make their content freely accessible to readers). These concerns continue to affect social science and humanities journals published by small societies and groups of scholars (Lorimer, Lynch, & Provençal, 2006).

This study reports on the OJS experiment, involving the introduction of open source software systems into a site of considerable transformation, namely scholarly communication in the twenty-first century. OJS is but one of a number of open source journal management systems (see Cyzyk & Choudhury, 2008, for a review of comparable systems). It is being used by approximately 5,000 journals, has had 19 upgrade releases since its was first made available in 2002, and is now available in 20 languages. It is currently supported by a team of programmers led by Alec Smecher and managed by Brian Owen, in association with Simon Fraser University Library, with funding from a variety of granting agencies and, to a lesser degree, service and hosting contracts.

In March 2009, we conducted our first survey of journals that deploy OJS, and this article reports on the results of that survey, to which 998 editors or staff members responded. The results point to how these journals – largely independent, scholar-published titles with roughly half originating in the developing world – are not otherwise represented in current and pressing discussions on the future of scholarly publishing, especially when it comes to matters of journal costs, revenues, and publishing models. This article begins with a brief review of select previous surveys of scholarly journals, looking specifically at questions that bear on this current study, including the steady growth of journals, the distribution of different publisher types, and the variance in costs involved in journal publishing.

Previous journal surveys

David A. Kronick (1961), in his survey of seventeenth- and eighteenth-century journals, has found continuing concerns over the journal's role in the fragmentation of knowledge, the tendency of journals to go out of business within five years (1961), and

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the need for multiple reviewers (2004). Kronick also documents the early preponderance of independent journals (neither society nor commercially published) – particularly pertinent to this survey – with that dominance persisting until the middle of the nineteenth century, after which society-sponsored journals prevailed, followed by, in the latter half of the twentieth century, the growing market share of corporate journal publishers (2004).

In terms of contemporary journal publishing, the U.S. National Science Foundation's Office of Science Information Service (OSIS) conducted and sponsored a number of surveys. In 1954, Robert Tumbleson and Helen L. Brownson published an OSIS study of 100 journals, establishing that editorial costs ranged from 2 to 11% of the journal's total expenses, while printing-related costs ranged from 65 to 80%, with the higher figure holding for the relatively common smaller-circulation journals, with less than 1,000 subscribers. Authors faced publication charges with 16 of the journals, while an additional 11 charged for publishing "longer" articles (1954, p. 359).

In a 1959 study, OSIS found that 80% of the 262 scholarly journals surveyed were published by scholarly societies, with 13% published by commercial presses, and 7% by university publishers (OSIS, 1964). The university and society journals were older and more established, with average ages of 41 and 33 years, respectively, compared to the average age of the commercial journals, which was 17 years. During the previous 10-year period, from 1949 to 1959, 74 new journals were launched, with 26% published by commercial ventures, suggesting that the commercial publishers were beginning to take a more active role in launching new journals compared to the scholarly societies, in a trend that would continue through to the end of the century and beyond (Willinsky, 2009).

The OSIS study established that subscriptions to the commercial publishers' journals cost twice as much as those for scholarly society and university journals. The study also estimated the average operating costs per journal to be $31,500 (in 2008 dollars), of which 68% could be attributed to printing costs. Editors were reported to be working 711 hours annually on their journals. Forty percent of them were receiving some form of remuneration for these efforts, with editors of commercially published journals tending to work fewer hours (478 hours on average) while being somewhat more likely (52%) to be paid. Journals were also growing larger during this period, with a 52% increase in the number of articles published per journal from 1949 to 1959, moving from 83 articles to 126 articles per year. However, society and commercial journals were also making efforts to reduce the length of individual articles and print more words per page as a means of decreasing production costs. University presses, on the other hand, continued to print longer articles with fewer words per page than society and commercial presses. The authors of the OSIS study note ominously that "if they are to continue to publish journals, [university presses] will probably, very soon, have to face the stern realities of economics that the society journals are in the midst of combating" (1964, p. 16).

In 1976, Bernard M. Fry and Herbert S. White found that, in a survey of 254 U.S. journals, 114 of the titles were published by scholarly societies, with 50 titles held by commercial publishers and 34 titles handled by university presses, leaving 56 titles in the category of "other." Fry and White found that between 1969 and 1973, the number of journals grew by 3.9% overall, although this growth rate was now more than double for commercial publishers. As well, commercially published journals were nearly double in size of those

from other publishers (with 1,010 pages annually), justifying their additional costs and demonstrating their willingness and ability to respond to the increased research output experienced during this period.[2] Fry and White (1967) also found the situation for scholarly society journals, as well as for university press journals, "depressed and depressing," with university presses consistently losing money, while societies managed to recoup roughly a 3% surplus from subscription sales over their costs (p. 81). Commercial publishers, on the other hand, had returns in the area of 11 to 14%, partially through their ability to attract a greater proportion of international subscribers. Fry and White hoped that better information about the costs of publishing might lead to "proposed joint actions by publishers and research libraries aimed at achieving cooperative and reasonable results to both communities" (p. 1). The situation also called for, in their eyes, federal subsidies for libraries, publishers, and authors.

Soon after Fry and White, Fritz Machlup and Kenneth Leeson (1978) published a study of 171 journals, evenly divided between society and commercial publishers. Machlup and Leeson also found that university presses lost money, while society and commercial publishers were increasing prices, generating surpluses of $193,030 (in 1975 dollars) in the case of societies and $133,800 among commercial presses. However, the size of the price increases favoured the commercial publishers, which were in this period charging twice the price of society journals on average (and six times that of university press journals), although commercial publishers did offer larger journals. The publishing costs for the journals varied from $10,200 to $1,195,800 annually, with a mean of $214,000.[3]

At the beginning of the twenty-first century, Carol Tenopir and Donald W. King (2000) reported that among 6,771 titles published in the United States in 1995, 40% were commercially published, 23% by scholarly societies, 16% by educational publishers including university presses, and 21% by "others" (p. 237). Tenopir and King estimate that publication expenditures were $4,550 per article or $325 per page in 1995, with $20 per manuscript page spent for "manuscript receipt processing, the selection of at least two reviewers, and review processing" (p. 257). They also estimate that for a new journal, it would take an investment of $63,187 in advance of printing the first issue, while for an electronic journal they report that the American Psychological Association estimated start-up costs of $181,000 for basic system costs and licensing fees.

In 2007, after reviewing "hundreds of publications on the topics of the cost and price of journal publishing," Donald W. King (2007) noted how this literature was marked by inconsistencies in measurement and ambiguities in the very terms and concepts used (2007, p. 85). Still, King was able to summarize a dozen studies on the question of first-copy publishing costs (excluding distribution costs) in 2006 dollars, showing a range from $450 to $2,500 per article, for one study of 10 publishers, to $2,540 to $11,420 per article for an MIT Press study. To those "fixed, direct costs," King points out that expenses needed to be added for "conducting business," which includes "headquarters, general and administrative (G&A), and overhead[,]" increasing the per-article expense by 20 and 50% (p. 99).[4] King provides an explanation for the wide variation in costs among publishers that includes such factors as rejection rates and "the characteristics of resources employed" (p. 104).

Also since the turn of the century, a number of surveys have focused on the impact that open access to research is having on the citation and "hit" rate of the scholarly literature (Hitchcock, 2009). These surveys have established that when open access is provided to an article, whether through authors self-archiving their own article or having it published in an open access journal (Harnad et al., 2008), open access has been shown to lead to an increase in readership (e.g., Davis, Lewenstein, Simon, Booth, & Connolly, 2008) and an increase in citations (e.g., Eysenbach, 2006) when compared to similar work that has not been made open access.

Finally, Mark Ware and Michael Mabe (2009) have recently released *The STM Report: An Overview of Scientific and Scholarly Journals Publishing* (2009), which sets out the scale of an $8-billion industry (for STM journals), representing 25,000 titles (across all fields), with that number growing at a rate of 3.5% a year over the past two centuries. Ware and Mabe point to how commercial publishers now constitute 64% of the journals listed in the highly selective ISI Web of Science index.[5] They hold that the number of active authors drives the scale of publishing, with only 20% of the estimated 5.5-10 million researchers worldwide active in the sense of having published more than once. That the increase in the number of journal titles (and number of articles) currently matches growth of "US R&D workers" (p. 23) only adds to the sense of constrained global participation in scholarly publishing. Ware and Mabe report that 90% of journals in all academic areas are now online, with only 2% of these titles publishing in an open access format. They estimate that the cost of seeing through an article to publication, "excluding non-cash peer review costs" (p. 52), at $3,800.[6] They note both that this figure is higher than the typical "article processing fees" that are now charged by open access biomedical journals, while also observing that such fees cannot be applied to all fields, given that 25% of researchers work in developing countries and 60% do not have "separately identifiable research funding" (p. 52) that might cover those costs.[7]

This brief survey of research on scholarly journal publishing points to the challenges of formulating an accurate, systematic picture. Judging by the estimates provided, very different economic models have developed over time among profit and non-profit publishing interests for providing essentially the same services in publishing the research article. It is not clear the degree to which the large differences in costs and pricing are necessary or how well they serve the larger scholarly communication goals of advancing research and scholarship. The study presented here further complicates the picture by presenting data that only adds to the difference in costs presented in the previous studies, but it also demonstrates a revitalization of the independent journal that has not been well represented in previous studies. This loosely grouped class of journals, sharing a common open source software system, casts new light on, among other things, journal cost structures (fixed, direct, and indirect); the growing dominance of the commercial publishers; the sense of a steady, modest growth rate in journal titles; and the participation, more generally, of researchers in the production of research and scholarship on a globally accessible scale.

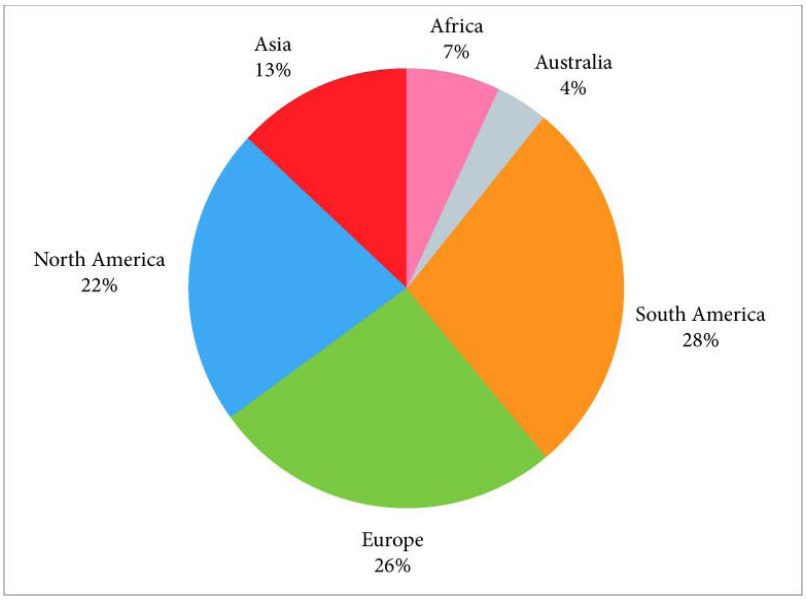
Methodology

The sample for this study was assembled by conducting a search on distinct terms used by the Open Journal Systems software, leading to the identification of a pool of 3,000 titles in January 2009, after eliminating those that were clearly demonstration or test installations.

Some of the journals we retained in our sample had not yet published an issue (and some had been established prior to 1900). From the journal sites that we have ascertained, we were able to locate a contact name and email address for what proved to be 2,748 editors or journal managers (as some journals had out-of-date email addresses), to which we sent an invitation to participate in an online survey that was hosted by Survey Monkey.

The survey included sections on journal basics, editorial process, economic model, readership and indexes, contributions and challenges. Of the 2,748 invitations that we believe were received, 998 provided usable responses to the survey, for a response rate of 36%. The survey was in English, and given the variety of languages into which OJS has been translated, this undoubtedly affected the distribution of responses, although each of the world's regions are represented in the surveys submitted, with South America the strongest area of response, led in large measure by Brazil (see Figure 1).[8] With funding from the International Development Research Centre (IDRC), the International Network for the Availability of Scientific Publications (INASP), the McArthur Foundation, and the Mellon Foundation, the Public Knowledge Project has focused a good deal of its support, through workshops and other initiatives, on journals located in the "developing world," and these amounted to 47.9% of the sample that completed the survey.

Figure 1: Distribution of journals using OJS by continent (*N*=987)



Survey results

1. Journal basics

Among the close to 1,000 titles in this sample, 40% published research in the sciences, technology, and medicine; 30% were social science journals; and 11% were in the humanities (see Table 1). This distribution reflects the general pattern of take-up in online publishing, which has been led by the sciences, with the humanities still catching up. However, 19% of the journals in the study cut in interdisciplinary ways across these three broad areas, by publishing, for example, in global or regional studies, or by representing the work of a university or other institution. This list of journals also includes highly specialized titles – on virtual worlds, surveillance studies, architecture and environment, Foucault studies, violence injuries, clinical governance, which

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suggest how scholar-publishers can more readily support the emergence of new areas of study and new approaches to scholarship. These have their risks, certainly, in terms of the proliferation and disappearance of titles, but can also be seen to open doors in the pursuit of academic freedom (Willinsky, Murray, Kendall, & Palepu, 2007).

Table 1: Journal topic areas by number of journals

Journal Topic Areas	Journals (%)
Sciences	392 (40)
Social sciences	298 (30)
General works (multidisciplinary)	182 (19)
Humanities	108 (11)

In marked contrast to the findings of other studies, only 6% of these journals are published by commercial houses compared to the 64% reported by Ware and Mabe (2009) and Crow (2005). Scholarly societies published 32% of the titles in this sample, exceeding the 23% that Crow found scholarly societies "self-publishing" in his study of journals as a whole (with societies having turned over 17% of the journals being published to commercial publishers to publish on the society's behalf). This leaves the vast majority of the journals in this sample as published or sponsored by an academic department (51%), a non-profit publisher (16%), a research unit (10%), or an independent group (10%), although these percentages cannot be added up, as respondents could choose more than one sponsor (see Table 2). As well, it needs to be allowed that commercially published journals would be less likely to complete such a survey, given a noted reluctance among this constituency to share information about publishing practices (Houghton et al., 2009). Still, these results suggest that the majority of these journals fall into what can be identified as the independent or scholar-publisher titles.

Table 2: Sponsoring organizations by number of journals

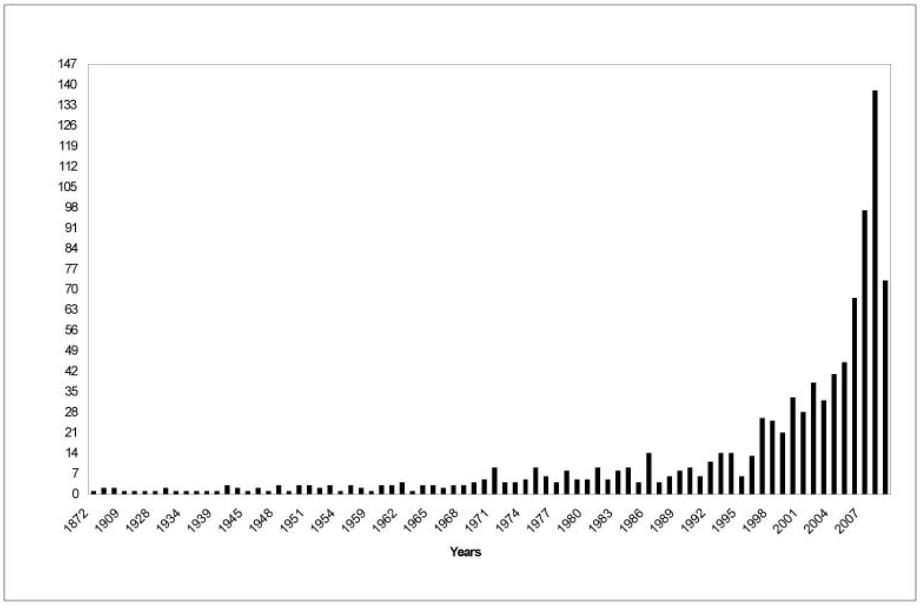
Journal Sponsor	Journals (%)
Academic department	491 (51)
Scholarly association or society	307 (32)
Non-profit publisher	153 (16)
Research unit	145 (15)
Independent group	93 (10)
Commercial publisher	58 (6)
Other	150 (16)

Note: Respondents were able to select more than one sponsor or publisher.

The majority of the journals using OJS are twenty-first-century products of the digital era (see Figure 2). The number of journals employing OJS has been growing at a rate of 81% per year on average since the software was launched in 2002 (see Figure 2). The number of new journals using this software to start publishing has been increasing at a rate of 47%, beginning in 2005 when the software began to catch on. This level of growth can be compared to Ware and Mabe's (2009) finding that "the number of peer reviewed journals published annually has been growing at a very steady rate of about 3.5% per year for over three centuries" (p. 18). While OJS is helping a new wave of journals get established, at least five of the titles now using OJS were launched prior to 1900, and 216 titles were started prior to the appearance of the World Wide Web

in the early 1990s. As well, a small number of journals (7%) have taken advantage of OJS's capacity to import back issues to enable online readers to access issues that were published prior to the internet (see Table 3). Close to half of the journals (45%) report having had print editions at some point in their publishing histories, even as the majority of these journals printed less than 100 copies (with three journals printing over 5,000 copies). This suggests that roughly half the journals using this software are "born digital," with a majority of them using OJS from the outset.

Figure 2: Year that journals using OJS started publishing



Note: The survey was conducted in April of 2009 and thus the bar represents a third of a year.

Table 3: Oldest issue available online by number of journals

	N	1872-1900	1901-1950	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2009
Oldest issue online	859	1	9	4	9	19	21	92	704

2. Editorial practices

One measure of the size and vitality of the journals comes from the number of manuscript submissions they receive. In this case, submissions ranged from zero in the previous month for the 8% of journals that have yet to get underway (although they may be open and have yet to receive any submissions), to the small number (3%) that are taking in more than 60 submissions a month (see Table 4). The majority of the journals (52%) are receiving between 1 and 10 submissions a month. This reflects the "youth" of these journals as well as the fact that close to half of them are published in developing countries, where working conditions often do not support a very productive research culture (as faculty members have to hold multiple jobs to sustain a living). As for these journals' rate of publication, they produce 31 articles per year on average. This falls considerably short of Björk, Roos, and Lauri (2009) estimate for ISI

Web of Science journals, which they place at 111 articles annually (with such productivity a quality measure for ISI), yet it does compare to the average of 26 articles they found among journals not listed in ISI.

Table 4: Submissions received in previous month and articles published in previous year by number of journals

Submissions/ month	*N*	0*	1-10	11- 20	21-30	31-40	41- 50	51- 60	> 60		
Journals (%)	919 (100)	76 (8)	530 (58)	184 (20)	58 (6)	30 (3)	8 (1)	8 (1)	25 (3)		
Articles/ Year	*N*	0*	1-10	11- 20	21-30	31-40	41- 50	51- 60	> 60	Articles *Mean*	*SE*
Journals(%)	746 (100)	60 (8)	173 (23)	214 (29)	104 (4)	63 (8)	36 (5)	28 (4)	68 (9)	31	1.8

Note: Mean for articles per year includes journals that reported one or more articles published. Mean could not be calculated for submissions, as respondents selected a span of numbers rather than providing a discrete number.
*The journal has not yet begun to accept submissions.

Articles submitted to a scholarly journal typically go through a peer review process. Within this sample of journals, 89% of the journals use external peer reviewers, with over half of the journals drawing reviewers from an international pool of scholars and assigning more than one reviewer to a paper (see Table 5). The review process is blind in the majority of cases, with authors' names kept from reviewers among 70% of the journals and reviewers' names kept from authors among 82% of the journals.

Table 5: Article review process by number of journals (*N*=919)

Editorial task	Journals (%)
Articles are reviewed by journal editors	649 (71)
Articles are reviewed by outside (or external) peer reviewers	818 (89)
Peer reviewers are drawn from an international pool	526 (57)
More than one reviewer is assigned to a paper	753 (82)
Reviewers do not see authors' names	644 (70)
Peer reviewers' names are not shared with authors	750 (82)

A journal's acceptance rate for submissions, after this review process, is typically regarded as one measure of journal quality (see Table 6). Of the journals actively publishing issues in this sample, the acceptance rate was relatively evenly distributed, with 115 journals having a very lenient acceptance rate of over 90% and 155 journals having a very stringent acceptance rate of below 30%. Houghton et al. (2009) report a "consensus from the literature" that places the rejection rate at 40 to 60%, which a majority of the journals in this sample adhere to or exceed in rigour (p. 154).

Table 6: Percentage of articles accepted for publication by number of journals (*N*=845)

Acceptance rate	< 20%	21- 30%	31-40%	41-50%	51-60%	61-70%	71- 80%	> 80%
Journals (%)	65 (8)	90 (11)	110 (13)	113 (13)	97 (12)	137 (16)	118 (14)	115 (14)

3. Journal staffing

The journals in this sample are staffed, on average, by seven editors, with 30% of the journals operating with more than six editors (see Table 7). The commercial publisher Elsevier, which publishes 2,000 journals, averages 3.5 editors per journal (Elsevier, 2009). The greater number of editors, found in this study, enables the workload to be distributed, a process that is facilitated by having all of the relevant materials on the journal website.[9] All of the journals reported that at least one of their editors was doing this job for the first time and at least one of the editors was from another country, speaking to the beneficial mentoring and international collaboration that the journals are fostering. The editors also indicated that they put roughly one day a week into editing the journals, with a few reporting that they work full-time on the journals.

Table 7: Characteristics of editors working on the journals by number of journals

No. Editors/ journal	***N***	**0**	**1- 5**	**6-10**	**11-15**	**16- 20**	**21- 25**	**26- 50**	**> 50**	***Mean***	***SE***
Editing journal (%)	883 (100)	N/A	621 (70)	123 (14)	55 (6)	29 (3)	16 (2)	30 (3)	9 (1)	7	0.4
First-time editors (%)	746 (100)	138 (19)	527 (70)	56 (8)	14 (2)	6 (1)	0 (0)	2 (0)	3 (0)	3	0.33
International* (%)	761 (100)	458 (60)	213 (28)	50 (6)	18 (2)	10 (1)	4 (1)	6 (1)	2 (0)	6	0.22
Hours/week	***N***	**0**	**1- 5**	**6-10**	**11-15**	**16- 20**	**21- 25**	**26- 50**	**> 50**	***Mean***	***SE***
No. of editors (%)	785 (100)	N/A	410 (52)	216 (28)	56 (7)	59 (8)	11 (1)	32 (4)	1 (0)	8	0.3

*International refers to editors living in countries other than the one that the journal is published in.

In terms of the distribution of publishing tasks, this group of journals represents very active editorial teams, with 76% of the editors engaged in copy editing, 70% involved in proofreading, and 58% taking a hand in laying out the articles (see Table 8). This does not mean that the editors had sole responsibility for these tasks, although this does appear to be the case in at least some instances. There are also journals with paid employees doing copy editing, layout, and proofreading. Students, whether paid or volunteer, play a relatively minor role in the production of these journals, with no more than 10% of the journals deploying students in this way. It is also worth noting that, although OJS is designed to enable the author to participate in both the copy editing (to review copy edits and respond to author queries) and proofreading, in the majority of cases the journals are not involving the authors in these tasks.

Table 8: Who does what in the publication process, by number of journals (*N*=919)

Staff Position	**Copy editing (%)**	**Layout (%)**	**Proofreading (%)**
Journal editor	695 (76)	532 (58)	646 (70)
Employee	226 (25)	327 (36)	239 (26)
Article author	274 (30)	139 (15)	454 (49)
Student volunteer	79 (9)	80 (9)	82 (9)
Student employee	73 (8)	91 (10)	70 (7)
Other volunteer	80 (9)	77 (8)	94 (10)

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Most editors (77%) reported working without compensation from the journal, with only 16% reporting some form of remuneration (see Table 9). Understandably, most editors reported, in another item, that they were motivated to edit the journal by non-monetary concerns, with "service to community" and "providing new knowledge" topping the list. Among paid employees of the journal, the leading role was the graphic designer, also known as the layout editor (who turns the manuscript into the form of a publishable article). Among paid roles, the layout editor was closely followed by technical support, with 37% of the journals paying a fee for these services. On the other hand, 36% of the journals have unpaid and 25% have paid clerical support, which suggests that OJS is having only very limited success in reducing or replacing this aspect of scholarly publishing, which had been part of the thinking that had gone into its design (Willinsky, 2005). A small percentage of the peer reviewers used by the journals are paid (7%), and this seems to be the case only in the field of economics.

Table 9: Basis of staff participation in journal role by number of journals

Role	*N*	No fee paid (%)	Fee paid (%)	N/A (%)
Editors	829	637 (77)	136 (16)	56 (7)
Journal managers	784	496 (63)	196 (25)	92 (12)
Peer reviewers	807	723 (90)	53 (7)	31 (4)
Graphic designers	751	262 (35)	309 (42)	180 (24)
Technical support	765	339 (44)	281 (37)	145 (19)
Clerical support	713	257 (36)	178 (25)	278 (39)
Promotional work	708	312 (44)	93 (13)	303 (43)

Note. Number in subsample (*N*) refers to those who responded to individual items.

4. Journal revenue, expenses, and access policies

The journals completing this survey are tapping into all of the traditional sources that have been relied upon to fund scholarly publishing (see Table 10). However, while a few journals are bringing in substantial amounts in certain categories, the vast majority are receiving no or relatively small amounts of revenue from these typical channels. The strongest source of revenue comes in the form of subsidies, which a third of the journals reported receiving, at an average $15,000 per year. These subsidies, as well as grants, may be from the institution, the state, or a donor, and a number of programs exist for the subsidization of scholarly publishing (e.g., Lorimer, Lynch, & Provençal, 2006). There are, as well, the admittedly mysterious "other sources," which 9% of the journals stated as a source of revenue, for an average of $26,475. Submission fees (used by 3% of the journals) and publication fees (9%), which are often held up as the open access model (although such fees are principally applied in the case of biomedical journals), play a very small part in this class of journals.

Subscriptions, principally from the print edition, were a source of revenue, on average $7,815, for 25% of the titles in this sample, with 47 journals reporting subscription revenues of less than $100 a year (but greater than zero), while 10 titles collected over $10,000 annually. Subscription-related expenses (print, postage, and subscription management) were higher than subscription revenues, on average, leaving a deficit of $4,174 on average. Only 17 titles out of 247 produced a surplus of more than $100 from their subscriptions, while 230 journals showed a loss of greater than $100 a year, suggesting a need for at least a 50% increase in subscription prices (which typically

leads to subscription cancellations). Alternatively, the journals might consider dropping print and subscriptions entirely. Yet at the same time, nearly 60% of the subscription journals experienced an increase in subscribers over the previous year (see Table 11). These journals gained an estimated 124 subscribers on average over the previous year (representing a 20% increase in average number of subscribers), although such increases could simply add to the deficit created by subscription-related expenses. The journals that offered free online access did gain somewhat more subscribers (and lost fewer) than titles for which both online and print editions required subscriptions.

Table 10: Sources and amounts of annual journal revenue (US$) by number of journals

Revenue	*N*	$0	$1-100	$101-500	$501-1,000	$1,001-5,000	$5,001-10,000	$10,001-100,000	> $100K	Mean	SE
Subscriptions*	723	586	47	31	15	22	12	9	1	$7,815	$4,915
Advertising	697	648	13	11	3	14	2	5	1	$16,807	$11,734
Member dues	697	617	26	9	8	19	10	7	1	$5,322	$1,977
Publication fees	704	640	19	17	5	13	5	5	0	$3,188	$852
Submission fees	704	683	11	6	1	2	1	0	0	$867	$384
Pay-per-view	697	688	3	3	2	0	0	1	0	$2,077	$1,745
Reprint fees	691	649	20	4	6	8	1	3	0	$2,200	$805
Endowment	679	672	2	2	2	1	0	0	0	$2,303	$1,219
Grants	682	599	0	5	3	33	15	26	1	$15,594	$2,754
Fundraising	671	609	3	10	9	24	11	5	0	$6,199	$1,735
Subsidies	673	450	11	18	23	73	32	64	2	$15,024	$5,433
Other sources	534	488	8	3	8	11	8	7	0	$26,475	$21,674

Note: The number in subsample (*N*) refers to those who responded to individual item. Means include only those journals that reported a revenue greater than zero for the item.
*Includes institutional and individual subscriptions.

Table 11: Change in subscriptions in past year

Journals	*N*	Journals with increase in subscribers	Average increase in subscribers	Journals with no change in subscribers	Journals with decrease in subscribers	Average decrease in subscribers
All journals with subscriptions	247	145 (59%)	124	62 (25%)	40 (16%)	−177
Print and online by subscription	50	23 (46%)	108	19 (38%)	8 (16%)	−480
Print by subscription; online open access	95	39 (41%)	143	41 (43%)	14 (15%)	−111

Note: As this table draws on data from two survey items with different response rates, the response rates of the two subcategories (rows 2 and 3) do not add up to "all journals with subscriptions."

This brings us to the journals' online access policies, which obviously also affect their revenue (see Table 12). Most of the journals in this sample (83%) offer immediate open access to their online content. Among these open access journals, 20% continue to offer a print edition by subscription. A further 8% of the total number of journals provide a form of embargoed access, with their content being made freely available some months after publication. OJS includes a subscription module within the software that can restrict access to subscribers and subscribing institutions, with 11% of the journals requiring subscriptions for both online and print access. In addition, 13% of the journals permit authors to self-archive a copy of their article (typically the

Edgar, Brian D., & Willinsky, John. (2010). A Survey of the Scholarly Journals Using Open Journal Systems. *Scholarly and Research Communication*, 1(2): 020105, 22 pp.

final peer-reviewed draft) in an institutional repository or on the author's website (with 1% allowing this only after an embargo period).[10] A further analysis of the data reveals that only 10 of the 87 journals that require subscriptions for both print and online permitted authors to immediately self-archive their work, while a further six permitted a form of embargoed access (pointing to a means of open access that OJS could do more in the future to support and encourage).

Table 12: Journal access policies by number of journals (*N*=829)

Policy	Journals (%)
Open access to journal content	688 (83)
Open access online/subscription for print	168 (20)
Embargoed access	70 (8)
Partial open access	15 (2)
Permit immediate author self-archiving	109 (13)
Permit delayed author self-archiving	11 (1)
Subscription for print and online access	87 (11)

Note: Respondents could choose more than one policy.

Although there is strong support for open access within this sample of journals, editors did not rank it highest when asked what mattered most to authors in selecting a journal. Peer review ranked high, with 85% of respondents ranking it very important or most important. Other important factors were journals appearing online (76% very important plus most important), being indexed (63%), and citation rates (61%); possessing an open access policy (at 59%); and the related extent of the readership (57%). When Garvey asked a similar question of researchers, he found that a journal's ability to provide an appropriate audience was "the major basis" for opting to submit to that journal for four-fifths of the authors polled (1979). Indexing, citation counts, and online access may well have complicated the sense of securing the appropriate audience, which used to be far more a matter of researchers reading selected journals rather than researchers searching relevant articles (Tenopir, King, Edwards, & Wu, 2009).

One parallel that is sometimes drawn between open access journals and subscription journals is between "registered readers" and subscribers (see Table 13). The registered reader is sent the table of contents with each new issue and their number represents a level of interest in the journal. Of course, subscriptions do not guarantee readership either, for they may well represent libraries – increasingly likely as individual journal subscribers continue to decline (Tenopir & King, 1998). The survey provided instructions on how to check for the number of registered readers using OJS, and while only 563 journals responded to this item, the average number of readers for those journals that had registered readers (and this option can be turned off in OJS) was 1,155, with the majority of journals coming in under 500. The 278 subscription journals had 611 subscribers, falling well within the broad range of 300 to 3,000 subscribers a recent report stated as typical of scholarly publishing (CEPA, 2008).[11]

In terms of publishing costs for the journals, a similar pattern to revenue unfolds, with some journals accruing expenses for all of the typical items, while not one item was an expense for the majority of journals. Journal printing (averaging $9,463 annually) was the most common expense, with 40% of the journals noting charges

for this item (see Table 14). Postage (average $2,526) was not far behind, with 37% of the titles recording this as a cost. While the single most expensive item proved to be subscription management costs, with an average of $12,728 annually, only 4% of journals reported this expense. Still, given the average income from subscriptions of $7,815 and the continuing questions about the sustainability of print editions, it would seem that journals in this sample may well welcome the initiative among libraries and readers generally to drop print journals and rely entirely on electronic editions (Prabha, 2007). As noted in journal staffing above, the management of the journal is a cash expenditure for at least 37% of these journals (somewhat higher than reported in Table 9), at an average cost of $9,053 annually, while 24% pay for copy-editing services (average $3,973), 28% for layout ($2,756), and 19% for proofreading ($1,613).

Table 13: Registered readers and subscribers by number of journals

Registered Readers	*N*	0	1-500	501-1,000	1,001-5,000	5,001-10,000	10,001-100,000	Readers *Mean*	SE
Journals (%)	563 (100)	48 (9)	387 (69)	63 (11)	53 (9)	2 (0)	10 (2)	1,155	281
Subscribers	*N*	0	1-500	501-1,000	1,001-5,000	5,001-10,000	10,001-100,000	Subscribers *Mean*	SE
Journals (%)	388 (100)	110 (28)	214 (55)	30 (8)	29 (8)	3 (1)	2 (1)	611	98

Note: Means include only those journals that reported some readers or subscribers.

Table 14: Annual journal expenses (US$) by number of journals

Expense	*N*	$0	$1-100	$101-500	$500-1,000	$1,001-5,000	$5,000-10,000	$10,001-100K	> $100K	*Mean*	*SE*
Editorship	657	522	14	23	11	54	14	20	1	$6,442	$1,179
Management	652	474	20	32	24	46	28	26	2	$9,053	$2,054
Copy editing	630	478	13	35	35	46	13	10	0	$3,973	$851
Article layout	630	454	16	52	32	61	9	6	0	$2,756	$619
Proofreading	622	504	15	36	30	30	5	2	0	$1,613	$225
Website	625	457	63	54	31	19	0	1	0	$664	$98
Customization	599	545	11	21	7	14	0	1	0	$1,955	$925
Technical	617	494	19	38	27	32	3	4	0	$2,127	$450
Promotion	606	536	17	24	12	13	2	2	0	$1,991	$753
Subscription costs	599	577	0	6	2	10	0	3	1	$12,728	$9,002
Journal printing	635	379	4	29	26	111	39	44	3	$9,463	$2,055
Postage	627	396	51	65	49	49	9	8	0	$2,526	$541
Other	544	408	22	39	37	29	6	2	1	$5,447	$3,693

Note: Number in subsample (*N*) refers to those who responded to individual item. Means include only those journals that reported a revenue greater than zero for the item.

A further analysis of expenses was conducted to ascertain the "first copy" cost in preparing an article for publication. This is something of a standard economic measure in the publishing industry and was calculated for this sample of journals by summing the means for editorial, management, copy editing, layout, and proofreading expenses, including those journals that reported zero for these items (which is not otherwise the case for the means in Table 14, as noted). Using the average production of 31 articles annually for this set of

journals, the average first-copy cost of an article was $188.39. This can be compared to first-copy costs of $1,784 per article calculated by the Research Information Network, based on a review of the research literature and their own survey (RIN, 2008).[12]

In calculating the total revenues and expenses for individual journals, it appeared that 44% of the journals in the survey reported having zero revenue across all categories of revenue types, that is, they responded with a "0" rather than leaving it blank (see Table 15).[13] In addition, 16% were operating at $1,000 or less in revenue annually. Among those that declared at least one source of revenue, the average annual income was $28,474. A similar analysis of expenses revealed that a lower proportion (29%) was operating with zero expenses than was operating with zero revenue. An additional 20% declared expenses that did not exceed $1,000 annually. For journals with expenses, the average annual cost was $16,951.

While it may be tempting to compare average revenues and expenses in this table, which reveal an annual surplus of 40% (compared to industry leader Elsevier's annual "operating profit margin" of close to 23% in the years 1998 to 2000; McGuigan & Russell, 2008), it may make more sense to calculate the revenue-expense balance by individual journal (see Table 16). This calculation determined that half of the journals were breaking even, while 18% ran a deficit of more than $1,000 annually, and 13% reported a surplus in excess of $1,000. A comparison of subscription-related costs (printing, mailing, and subscription management) and subscription revenues suggests that this model leads to an average deficit of roughly $4,000, while a journal-by-journal analysis points to 17 journals clearing more than $100 on subscriptions against such costs, while 374 journals roughly broke even, and 230 lost more than $100.

Table 15: Total journal revenues and expenses by number of journals

Revenues	***N***	**$0**	**$1-1,000**	**$1,001-10K**	**$10,001-50K**	**> $50K**	***Mean***	***SE***
Journals (%)	761 (100)	336 (44)	120 (16)	180 (24)	101 (13)	24 (3)	$28,479	$9,711
Expenses	***N***	**$0**	**$1-1,000**	**$1,001-10K**	**$10,001-50K**	**> $50K**	***Mean***	***SE***
Journals (%)	711 (100)	208 (29)	139 (20)	222 (31)	115 (16)	27 (4)	$16,951	$5,542

Note: Means include only those journals that reported revenues/expenses greater than zero.

Table 16: Annual operating balances by number of journals (*N*=773)

	Deficit				**Even**	**Surplus**			
Annual Balance	> −$10,000	−$10,000-5,001	−$5,000-1,001	−$1,000-100	−$99-+99	+$100-1,000	+$1,001-5,000	+$5,001-10,000	> $10,000
Journals (%)	38 (5)	30 (4)	68 (9)	80 (10)	397 (51)	60 (8)	51 (7)	17 (2)	32 (4)

A final analysis compared journals with either low acceptance rates (30% or lower) or high acceptance rates (70% or greater) across differences in budget, age, access principle, publisher type, and continent status (see Table 17). This analysis revealed that fewer low-

acceptance journals (generally a measure of higher-quality journal content) are found in the "developing" continents of Africa and Latin America, compared to the developed continents. A greater proportion of subscription journals appear to have low acceptance rates than is the case among open access titles. Yet this matter of low acceptance rates does not appear to be a factor in distinguishing between society-sponsored journals and independent groups, nor between modestly and minimally budgeted journals, nor between older and new journals. On the other hand, high acceptance rates tend to be associated with a greater proportion of low- to no-budget journals, which are newer in origin, and which are scholar published rather than society sponsored. These comparisons speak to what it takes to build up and earn a following among authors, yet the high acceptance rates (and thus less discriminating journals) by no means constitute a majority in any of these categories among this sample, while all categories are represented among the journals boasting low acceptance rates.

Table 17: Distribution of journals by high or low submission acceptance rates

Submission Acceptance Rate	*N*	Low Acceptance (≥ 30%, *N* =155)	High Acceptance (≥ 70%, *N* =233)
Modest budget journals (> $10,000/a)	134	23 (17%)	28 (21%)
Minimal budget journals (≤ $1,000/a)	306	49 (16%)	106 (35%)
Older journals (≤ 1990)	194	32 (16%)	42 (22%)
Newer Journals (> 1990)	612	112 (18%)	187 (31%)
Open access (entirely) journals	619	101 (16%)	181 (29%)
Subscription revenue journals	57	14 (25%)	15 (26%)
Society-sponsored journals	259	56 (22%)	65 (25%)
Independent group	62	12 (19%)	22 (35%)
Developed continent	415	92 (22%)	121 (29%)
Developing continent	423	61 (7%)	110 (26%)

Note: The number (*N*) of journals refers to total number of journals in the category defined by the first column for which submission rates are known.

Discussion

This survey sampled a set of journals that share no more than an open source software platform, Open Journal Systems, which they use to manage and publish their content. Although this provided a relatively narrow focus among journals, the study did have close to 1,000 respondents, placing it among the larger studies of journal editors conducted on any basis. In some senses, this international set of journals drawn from across the disciplines are representative of the long-standing tradition in scholarly publishing. They conduct peer review of their submissions by drawing on an international pool of reviewers, leading to acceptance rates that are, in many although not all cases, comparable to those found among print journals. The journals in this study rely on the interest, energy, and commitment of faculty members and graduate students, much as journals everywhere do, just as these journals rely, as most do, on software systems to reduce clerical and managerial expenses, while facilitating a distribution of workloads among editors.[14]

The journals in this sample are directed by multiple editors and provide the typical range of editorial services for their submissions, if not as often hiring employees to undertake editorial tasks as traditional journals do. These journals owe a debt, if

perhaps more so than other journals, to the indirect support of Google Scholar for indexing the contents of these journals on publication, making them open to discovery on the same grounds as other journals, while providing readers with a degree of quality control, through Google's page ranking and the citation counts it provides in its search results.

Yet this sample also stands apart from the majority of journals. Where a small number of large commercial publishers now dominate journal publishing (Crow, 2005), this study found that commercial entities formed the smallest category of publisher. The scholar-publisher – or, more accurately, the group-of-scholars-as-publisher – is responsible for the majority of journals in this study, constituting a type that dates back to the earliest days of the journal, when Henry Oldenburg launched the *Philosophical Transactions* as an independent, albeit commercial, venture. The scholar-publisher is now experiencing, this study suggests, a certain renaissance, facilitated by online, open access.[15]

The journals represented in this study also mark an expansion in the global circulation of knowledge. Close to half of the journals in the sample are published in developing countries, contributing, as well, to the growth in these countries of a research and review culture (with all the ramifications for participation in a knowledge-based economy).[16] As part of this growth, the journals that participated in this survey are decidedly younger, with fewer articles publishers, than the larger body of established commercial and society titles, subject to previous surveys. The journals in this sample are further distinguished by two closely related factors. First, open access is vital to their participation in this global circulation of knowledge (given what previous studies have established about traditional start-up costs and the extremely constrained ability of research libraries to take on new titles). Second, open access is made possible for this set of journals by the Internet and open source software, which have reduced publishing and distribution costs.

These journals are also in a position to contribute to future discussions about scholarly communication in light of their budgets, which appear to challenge what is often held up as the necessary and real cost of scholarly publishing, whether to prove the impossibility of open access publishing or to set a publication fee for authors to pay for open access.[17] The challenge posed by this set of journals becomes starkly apparent, whether one compares the first-copy costs from this journal sample of $188.39 per article, at roughly a tenth of the industry standard over the past decade (RIN, 2008), or the annual budget for the majority of these journals, which stands at less than what are held to be the "fixed" costs ($3,800) of a single article (Ware & Mabe, 2009). These figures bear comparison with work that Ted Bergstrom (2001) did to establish how the quality and quantity of journal content are no longer related to subscription price, when he demonstrated that the best journals in economics, which are published by scholarly societies, cost subscribers five times less per page than the lower-ranked commercially published journals. While the corporate sector takes an increasing share of the journal market, the independent scholar-publisher is proving to be the source of more new titles. This study only adds to the existing evidence attesting to how out of balance and economically irrational the current system of scholarly publishing is, and, by the same token, how important it might be for the academic community, perhaps led by the research libraries and scholarly societies, to seek a more rational and fair way

to both raise the overall quality of scholarly communication, which a more equitable distribution of funding would undoubtedly do, while fostering the openness of this marketplace of (peer-reviewed) ideas.

Recently, concerns have been expressed by researchers about journal proliferation more generally (RIN, 2009), and it is true that only a very small number of journals from this community have yet to acquire the high-quality markers of scholarly publishing.[18] On the other hand, and in favor of scholarly largesse, this same Research Information Network study (2009) found that researchers are citing more journal articles than they have in the past, while a long-term series of studies of scientist reading habits shows that they are continuing to increase the number of articles they read from a wider range of journals by drawing on electronic sources (Tenopir, King, Edwards, & Lu, 2009).

Conclusion

Open Journal Systems represents an experiment, now into its eighth year, on the effect that *open source* tools can have on journal publishing. This study documents how such tools have facilitated a revitalization of scholar-published peer-reviewed journals that are produced on a global scale and are universally available. It establishes the degree to which journals deploying OJS may be regarded as part of a larger series of digital-era experiments in scholarly communication, involving not just open access but open data, open archives, open source software, and open research instrumentation initiatives (Atkins et al., 2003). The academic community's commitment to this opening of research and scholarship, is reflected in the extra work it takes to ensure this level of openness, which often involves new systems for managing scholarly community. It reflects among a growing portion of that community a sense of responsibility for, and the value in, sharing what is learned. The priority given to this sharing reflects one of the intellectual properties of this work, which distinguishes it, we are tempted to conclude, from other forms of intellectual property.

This study also adds to the case for rethinking the financing of scholarly communication. The current model of scholarly publishing, with the two principal areas of growth operating at the economic extremes of major corporate publisher and independent collections of scholars, seems highly inefficient, in light of the contribution that both sectors are making to the circulation of knowledge. The scholar-publisher is mounting an effective response to the current hold that large commercial and society publishers have on research library budgets by pursuing a model of cooperative participation in the global circulation of peer-reviewed literature. It then falls to the rest of the academic community, perhaps led by the research libraries, to see that the journals represented by this study figure into future considerations of this multi-billion-dollar investment in scholarly communication (with $8 billion devoted annually for science, technology, and medicine journals alone; Ware & Mabe, 2009). Such an investment may appear better directed toward underwriting, for the benefit of humankind, universal access to the scholarly literature. Were the academic community willing, there is enough money on the table, this study suggests, to make this a reality in the years ahead.

Notes

1. On the economic role and place of the open source software more generally, Vance (2009) provides an apt summary: "There's an open-source alternative, and usually

a pretty good one to just about major commercial software product. In the last decade, their open-source wares have put a tremendous pricing pressure on their proprietary rivals. Government and corporations have welcomed this competition" (p. B6). Also, on the scholar-publisher, see the Open Access Scholarly Publishers Association, which has a special membership category for OA scientist/scholar publisher (www.oaspa.org).

2. On the research expansion following the Second World War, see Tumbleson and Brownson (1954): "Estimates of the Research and Development Board, Department of Defense, indicate that total expenditures for research and development have increased from $900 million in 1942 to $2,900 million in 1952. The industrial contribution has gone from $500 million to $1,200 million in this ten-year period while that of the federal government increased from $300 million to $1,600 million. The university contribution has doubled—from $50 million to $100 million in the same period" (p. 357). This was the period when the commercial journals stepped in, providing much-needed outlets for the resulting work (Willinsky, 2009).
3. As Donald W. King, Denis D. McDonald, and Nancy K. Roderer (1981) note in their study at this time, "journal resource expenditures" grew 584% between 1960 and 1975, well in excess of the corresponding growth (153%) in research funds during that period (p. 37). In calculating expenditures, King, Macdonald, and Roderer introduce the concept of "donated services" (p. 118), referring to the contributions of author, subject editor, and reviewer, placing the total value of this donation at $174,300 in 1977, compared to actual publication costs of $120,400 for the average journal in that year.
4. King (2007) cites a study by Page, Campbell, and Meadows (1997) that places the "marketing and sales" (p. 99) costs of starting a journal at $36,000 to $56,000 over five years in order to achieve 500 subscribers (2007), a figure that is placed in the areas of 6% to 15% of costs for existing journals by other studies.
5. The figure for commercial titles compares well to Raym Crow's (2005) estimates from 2005 for all journals listed in *Ulrich's Periodical Director*, a much more comprehensive source, which places commercial publishers at 63% of the market (with about a quarter of those published on behalf of societies), while scholarly societies still publish 23% of the journals on their own, leaving 15% as "other," such as universities.
6. This might be compared to a more recent CEPA study that placed the "total publishing and distribution costs per article" at $6600, while being clear that this differed by disciplines (CEPA, 2008, p. 6).
7. On "article processing fees," see the 2004 Wellcome Trust report, prepared by SQW Inc., with such fees presented as a potential path to open access for a greater circulation of research and a reduced cost per article, as there is no need to "carry any costs for subscription management, license negotiations, or many sales costs" (SQW, 2004, p. 2).
8. A follow-up survey in Portuguese, based on the similar questions, is underway in Brazil.
9. In the eighteenth century, Denis Diderot emphasized the need for editorial collectives by claiming that "it was impossible for a single editor to issue even a mediocre journal" in writing about journals in the *Encyclopédie*, for "a journal must be the work of a society of scholars" (cited by Kronick, 2004, p. 106).
10. While this may not seem necessary for open access journals, it is still a recommended practice in supporting these repositories and for posting preprints prior to publication.
11. Kronick (2004) notes that seventeenth-century journals were known to manage with less than 100 subscribers, while some had over 1,000; the first English-language journal, *Philosophical Transactions*, began with an ambitious printing of 1,000 copies.

12. The RIN notes the accord between its figures and King and Tenopir's (1998) calculations, which used "typical" publishing costs to arrive at a first-copy cost of $1,950 (while allowing that figures "vary dramatically" among journals and publishers).
13. For a detailed description of how a new journal operates (using OJS) on a zero budget through the efforts of colleagues, see Willinsky and Mendis (2007).
14. The journals might be said to be running on what King, Macdonald, and Roderer (1981) refer to as "donated services" (p. 118). Yet the university underwrites this donation, by recognizing (if never enough) the service of editors, reviewers, and authors to journals as part of a faculty member's job, which it does for all journals, and it also underwrites the additional expenses (including surpluses and profits) of other journals, as it pays subscription fees.
15. This sudden increase in new titles is not without something of a parallel. Ware and Mabe (2009) note that the "growth [in titles] did slightly accelerate in the post-war period 1944–78[,]" (p. 18) largely as a result of commercial journal publishers responding to increased research funding.
16. The strong global level of growth among the journals in this sample needs to be compared to the long-term growth rate of journals otherwise, which, as Ware and Mabe (2009) note, has matched the increase of "US R&D workers," (p. 23).
17. Colin G. Scanes, *Poultry Science* editor-in-chief, has posted an open letter dated January 20, 2010, to the scholarly world on this theme: "Who is to pay the very real costs of producing journals with this move to open access?" "How many journals will disappear if we go to a completely open access approach?" and "As a journal editor with, at present, a positive cash flow, we can and do waive page charges from papers from institutions in developing countries that cannot afford to pay these. We will not be able to continue this if there is a major reduction in revenue" (Scanes, 2010).
18. Among quality markers achieved by journals using OJS, see, for example, *Journal of Legal Analysis* (Harvard University Press); *International Journal of the Commons* (with guest editor, author, and editorial board member 2009 Nobel Laureate in Economics Elinor Ostrom); *Journal of Medical Internet Research* (ISI Web of Science's second-highest Impact Factor in health sciences); and *Knowledge Management for Development Journal* (taken over by a major corporate publisher, Taylor and Francis).

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