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Open Access Plan S and Its Revised Version: Genesis, Challenges, and Implications (Post- print)

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Abstract

[Purpose/Significance] Open Access Plan S has attracted extensive attention worldwide since its proposal in 2018. It is both important and urgent to systematically review the background, content adjustments, industry feedback, and impacts of Plan S and its revised versions. [Method/Process] Employing literature research and content analysis methods, and based on reviewing the broader open access environment, this study further explores the background, content adjustments, new challenges of Plan S and its revised versions, as well as their implications for related industries in China. [Results/Conclusion] The findings indicate that Plan S will exert certain influences on the journal publishing industry, library consortia, researchers, small society publishers, and data security.

Full Text

Plan S for Open Access and Its Revised Version: Genesis, Challenges, and Implications

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Abstract: *[Purpose/Significance]* Since its proposal in 2018, Plan S for open access has attracted widespread attention both domestically and internationally. It is essential and urgent to systematically examine the genesis, background, content adjustments, industry feedback, and impacts of Plan S and its revised version. *[Method/Process]* This study employs literature research and content analysis methods. Based on an analysis of the broader open access environment, it further explores the background, content adjustments, new challenges, and implications for relevant Chinese industries of Plan S and its revision. *[Result/Conclusion]* The findings indicate that Plan S will have certain impacts on

journal publishing, library consortia, researchers, small society publishers, and data security.

Keywords: Plan S; open access; library; academic freedom

The emergence of COVID-19 has once again reminded the academic community of the necessity for researchers to freely access research papers. US Patient and Disease Advocacy Organizations have stated that “information vital to health should not be locked behind paywalls.” In response to COVID-19, publishers Wiley and Elsevier have rapidly opened research channels on this topic, including subscription journals. All journals should be open access to support scientific progress worldwide. With the development of the open access movement and open science, academic communication is gradually breaking away from the traditional formal journal publishing model, with an increasing number of articles being published in preprints and open access journals. Full texts can be obtained through various channels such as Unpaywall, Sci-Hub, and ResearchGate. Publishers in monopolistic positions are gradually losing pricing control, and conflicts with research institutions and universities are intensifying. According to data from the Scholarly Publishing and Academic Resources Coalition (SPARC), since 2008, 53 institutions/consortia worldwide have canceled “big deals” (i.e., bundled journal database purchases), with 10 institutions/consortia canceling such deals between January and May 2019 alone. The editorial board of the *Journal of Informetrics*, whose research direction is scientific evaluation and communication, believes the journal should be open access under fair principles, requiring open access to references and citation data (open citation) and reduced article processing charges. However, publisher Elsevier rejected the editorial board’s request. On January 10, 2019, the editorial board (comprising 27 members and 2 associate editors) collectively resigned. On January 14, 2019, former board members partnered with the non-profit MIT Press to create a new open access journal, *Quantitative Science Studies*. In February 2019, the University of California and Elsevier failed to renew their subscription and publishing contract due to disputes over fee standards, and Elsevier terminated access to over 2,500 paid subscription journals for the University of California system. Subsequently, hundreds of universities and research institutes in Germany, Sweden, Norway, and other countries also stopped subscribing to Elsevier journals and databases due to similar subscription fee and open access issues.

In recent years, monopolistic mergers and acquisitions in the publishing industry have surged, and conflicts between publishers and library consortia, universities, and research institutions have intensified. J. Røttingen of the Norwegian Research Council has pointed out that research results funded by public finances are global public goods that anyone can utilize, and private entities should not be allowed to profit from knowledge. On September 4, 2018, cOAlition S (the Coalition for Open Access to Research) formulated ten principles for Plan S to ensure complete and timely access to academic papers in subscription journals, open access journals, or other platforms. The “S” in Plan S represents science, speed,

solution, and shock. Plan S comprises three parts: the Plan S principles, implementation guidelines, and technical guidelines. It aims to promote the sharing of public science and technology funds, break the publisher-dominated system, solve structural problems in academic publishing, and promote the transformation of subscription journals to open access models. Researchers who accept Plan S must publish their research results in open institutional repositories or open access journals, making global research papers freely available to the public via the Internet. R. Poynder, Associate Dean of Libraries at the University of Utah, notes that Plan S provides relatively greater benefits to third-world countries and fewer benefits to the most scientifically and technologically advanced nations. If open access fails to generate expected economic benefits, government financial support may quickly disappear. Y. Chi, Chairman of Elsevier, stated that any publishing model must consider costs; the only question is who pays, which is also the subject of discussion and controversy.

China has achieved certain results in open access, such as establishing the National Consortium of Institutional Repositories for Chinese universities, constructing the Chinese Academy of Sciences Institutional Repository Grid, and building the Chinese Academy of Sciences Preprint Platform for scientific papers. In 2014, the Chinese Academy of Sciences and the National Natural Science Foundation of China issued policy statements requiring that final peer-reviewed manuscripts (the author-accepted manuscript, AAM) from publicly funded research projects be deposited in repositories and made open access within 12 months of publication. In 2016, the National Science and Technology Library (NSTL) built an open repository for Chinese scientific research papers in natural sciences, accepting preprints and open archiving of published scientific papers in both Chinese and English. In 2017, NSTL signed the “OA2020 Initiative” letter of intent to actively promote open access to academic achievements. Domestic new media have actively responded to open access and open science, with coverage on WeChat public accounts (such as OA2020, “Library and Information Affairs”), blogs (such as the Enago official blog, personal blogs), and Weibo (such as “Intellectuals”). Chinese scholars including Fan Hao et al., Wang Chunsheng, and Zheng Ang have published literature on Plan S and open access. However, China still needs to strengthen its open access policies, investment, monitoring, and management. Domestic research on Plan S is important and urgent, requiring systematic organization, summarization, and analysis. To keep pace with international frontiers, this paper studies and organizes the background, content adjustments, new challenges, and implications for China of Plan S and its revised version, aiming to provide reference for establishing open access policies, mechanisms, and infrastructure environments.

Background and Industry Feedback on Plan S

Genesis of Plan S

Open access journals predominantly use electronic distribution, saving printing costs; high-quality free software for manuscript processing reduces data process-

ing costs; and unpaid peer review by most experts saves capital costs. These factors continuously reduce overall journal distribution costs. A. Mudditt, CEO of open access publisher PLoS, believes that electronic open access journals have lower distribution costs, and APC (Article Processing Charge) revenue is significantly higher than actually needed. Metadata from the Directory of Open Access Journals (DOAJ) shows that among its 13,063 indexed journals, APC prices range from \$1 to \$5,000. While distribution costs decline, publishing industry acquisitions and monopolies continue to increase, and subscription journal price increases exceed inflation. Springer Nature argues that APC costs include peer review, editing, technical processing, journal marketing, and customer service, and therefore high fees should be maintained. However, this view contradicts the reality of reduced distribution costs. The University of Oslo had already exhausted its annual public publishing budget by February 2018. Due to budget growth limits, some library consortia have been forced to cancel database subscriptions under financial pressure. Meanwhile, libraries and universities support open access, hoping to resolve the contradiction between limited funding and unlimited literature demand.

Industry Feedback on Plan S

Plan S Will Accelerate Journal Distribution Pattern Adjustment

Since Plan S was proposed in 2018, industry feedback has been continuous, including accelerating adjustments to journal distribution patterns and coexistence of support and criticism for Plan S. DOAJ data shows approximately 14,000 gold journals worldwide. Springer Nature's *Nature* and BMC series journals are gold journals where papers are immediately freely available upon publication. The number of open access journals is growing rapidly; Clarivate Analytics' 2017 JCR annual report showed that about 9,000 SCI-indexed journals had an open access journal proportion of 10.5%. With the development of open access and open science movements, the publishing industry's profit and business models have made corresponding adjustments, and the distribution pattern of international journal influence has been affected to some extent. Plan S requires complete and timely access to funded scientific publications, which is expected to impact the inherent journal distribution pattern, interest structure, and journal quality, thereby enhancing the accessibility, efficiency, fairness, and transparency of the global publishing industry. Benefiting from the global open access wave, China's journal publishing industry faces both opportunities and challenges that will help narrow the gap with developed countries.

Coexistence of Support and Criticism for Plan S Supporters of Plan S believe that achieving a global open access alliance should include funders from Europe, North America, Asia, and Africa. The United States has stated it will not join Plan S but still requires government-funded research results to be openly archived within 12 months of publication. In 2018, China expressed support for Plan S at the German Open Access 2020 International Conference,

though relevant policies have not yet been introduced. The first African research funding agency officially joined Plan S and received strong support from the African Academy of Sciences. Calls for Australian and New Zealand funding agencies to join Plan S are growing louder. The World Health Organization became the first UN agency to join Plan S, ensuring that health research it supports is freely accessible immediately upon publication.

However, opponents argue that Plan S seriously violates academic freedom. M. Pallante, CEO of the American Association of Publishers, believes Plan S violates academic publishing freedom, imposes strict controls on innovative commercial publishing markets, creates market access barriers for US publishers, and places unreasonable restrictions on researchers. Thousands of researchers signed an open letter expressing concerns and criticisms: first, the complete ban on high-quality hybrid journals, particularly in chemistry; second, excessive focus on the gold open access publishing model, where researchers pay high APCs per paper, potentially increasing total academic communication costs and contradicting Plan S's expected outcomes; third, Plan S ignores significant differences between research fields.

Background and Content Adjustments of the Revised Plan S

Revision Background of Plan S

Since its release, Plan S has faced both calls for support and questions. cOAlition S surveyed potentially affected stakeholder groups. After soliciting public comments, it received over 600 feedback submissions from universities, academic societies, publishers, associations, and scholars across more than 40 countries—the largest international survey on open access to date. cOAlition S listened to various suggestions and adjusted its originally radical approach, maintaining its principles while adopting a more moderate speed and attitude, and revising specific implementation methods.

In May 2019, cOAlition S released the revised Plan S. The start date was postponed by one year to January 1, 2021, providing research institutions more time to adapt and giving hybrid journals sufficient transition time. Support for transformative agreements was extended to December 31, 2024, allowing academic papers to be published in subscription journals provided the final peer-reviewed version and version of record (VoR) are deposited in open access repositories. The revised regulations allow more time before achieving complete, immediate open access and remove the upper limit on publication fees paid by journals.

Revised Principles of Plan S

From 2021 onward, all academic publications from research funded by national, regional, and international research councils and funding agencies through public or private funding must be published in open access journals, on open access

platforms, or made immediately available through open access repositories without embargo. The revised Plan S principles emphasize macro-level open access principles for scientific publications, standardizing open access principles across six dimensions: authors, platforms, funding, funding agencies, scope, and evaluation principles, as detailed in .

TABLE:1 Revised Principles of Plan S

1. Authors or their institutions retain copyright of their publications. To meet the requirements of the Berlin Declaration, journal publications should prioritize Creative Commons licenses (CC BY).
2. Funders establish comprehensive standards and requirements for services provided by high-quality open access journals, platforms, and repositories.
3. Where high-quality open access journals or platforms are unavailable, funders will adopt coordinated incentive measures and, when necessary, provide support for open access infrastructure.
4. Funders support diversified business models for open access journals and platforms. If open access publication fees are charged, they must correspond to publishing services provided, and fee structures must be transparent to inform the market and funding agencies of possible standards and caps for payment.
5. Where applicable, open access publication fees are borne by funders or research institutions, not individual researchers.
6. Funders encourage government, university, research institution, library, and academy groups to coordinate strategies, policies, and measures while maintaining transparency.
7. Compliance is monitored, and non-compliant beneficiaries/recipients are penalized.
8. Plan S principles should apply to all types of academic publications, though achieving open access for monographs and books will take longer and requires an appropriate process.
9. Funders do not support “hybrid” publishing models. Transitional pathways to full open access within clearly defined timeframes are only acceptable as part of transformative arrangements, for which funders may provide financial support.
10. Funders commit to evaluating research outputs based on intrinsic merit rather than the publication journal, impact factor (or other journal metrics), or prestige.

cOAlition S formulated ten revised principles to ensure technical requirements and recommendations. Specific applicable conditions were proposed for open access journals and platforms, and mandatory standards and recommended additional standards were established for open access repositories.

Main Content Changes in the Revised Plan S Guidelines

The initial and revised versions of Plan S guidelines were standardized across five dimensions: timeline, APC, licensing, evaluation, and transformative arrangements, as detailed in .

TABLE:2 Main Content Changes in Plan S Guidelines

Aspect	Initial Plan S	Revised Plan S
Effective Date	January 1, 2020	Postponed to January 1, 2021, providing buffer time for academic publishers and researchers
APC	Should be standardized and capped	No upper limit set, but publishing costs must be transparent
Licensing	CC BY for journal publications	CC BY 4.0 license, allowing some articles to use CC BY-ND
Evaluation	Based on intrinsic research value, not journal impact factor or prestige	Same principle maintained
Hybrid Journals	Not compliant with Plan S	3-year transition period for hybrid journals with committed conversion timeline; funders may provide financial support for transformative journals through December 31, 2024
Small/Medium Publishers	Not mentioned	“Transformative Agreement Model Contract” developed to help societies and small/medium publishers transition

The revised Plan S proposes three pathways to achieve open access. Researchers may choose to publish in transformative journals, open access journals/platforms, or subscription journals. cOAlition S provides financial support for the first two pathways and transformative agreements for the third. The three routes to full open access under the revised Plan S are shown in [Figure 1: see original paper].

FIGURE:1 Three Routes of Plan S

The revised Plan S maintains an open attitude toward other forms of transformative arrangements, proposing alternative models that may be more suitable

for certain publishers or initiated by publishers as part of their support for time-limited transitions to full and immediate open access.

New Challenges Posed by Plan S

Plan S may bring new challenges to society services, academic freedom, and publisher profits.

Impact on Society Services

Societies provide platforms for scientific research and disciplinary development, using revenue from products (books, journals, or databases) to support academic activities such as funding young scholars and organizing conferences. Many society publishers rely on publishing revenue to conduct these activities. The American Mathematical Society's Deputy Executive Director R. Harrington believes that Plan S cannot be applied to all society groups, and for most societies, journal subscription revenue remains important. The Genetics Society of America predicts that global implementation of Plan S would reduce its net income by one-third. Since society journals typically have high per-article production costs, they would ultimately be forced to cut professional training and public outreach and sell their journals to for-profit publishers. Multiple organizations including the American Mathematical Society, American Chemical Society, and American Cancer Society stated in an open letter that Plan S would affect peer review, cut society services, stifle scientific innovation, force society journals to close, and plunge academic publishing into chaos.

Plan S explicitly commits to not funding hybrid journals, significantly impacting society publishers. In response to their predicament, Plan S released "Transformative Agreements, Transformative Model Agreements, and Transformative Journals" to help society publishers transition to open access, with subsequent reports outlining 27 potential business models for society publishers. However, despite these generic recommendations, most society groups lack clear pathways to sustainable revenue. The project requires extensive price analysis by publishing business and sales staff, making negotiations difficult for small and medium societies. As subscription revenue decreases, large academic societies will consolidate their market position, but at the cost of eliminating small and medium society publishers. Chinese society publishers should accelerate their transition to open access publishing and build high-quality Chinese scientific journals.

Impact on Academic Freedom

Hybrid publishing model journals allow authors or funding agencies to choose whether to pay APCs for open access or not. Plan S ignores hybrid journals as a transitional alternative, and hybrid open access journals under the subscription pathway cannot receive financial support. According to Plan S requirements, publications can only be submitted to platforms offering free sharing

services or journals with transformative agreements, excluding subscription journals and potentially threatening scientific research and academic freedom. Some researchers express concern that reduced publication choices may negatively impact their future funding and tenure prospects. Currently, Plan S emphasizes journal open access but not scientific quality. The International Association of Scientific, Technical and Medical Publishers, Springer Nature, and Elsevier have all stated that Plan S provisions may restrict academic and publisher freedom. The American Association for the Advancement of Science believes the Plan S model cannot support high-quality peer review of scientific publications, making it difficult to guarantee paper quality and potentially hindering sustainable development of journal publishing. Journal quality, built on long-term records of publishing influential papers in specific fields, is crucial for ensuring scientific credibility. Plan S imposes strict controls on innovative private markets and unreasonable constraints on researchers. Freedom and constraint are dialectically related; academic freedom is freedom within certain bounds. In the open access context, China's National Natural Science Foundation and Chinese Academy of Sciences have issued statements supporting the deposition of project results in institutional repositories. As Plan S develops, national-level funded projects such as the National Social Science Fund, National Key R&D Program, and other funded research results should be published in open access journals or stored on third-party platforms for free access.

Increasing Publisher Profits

APC is not the primary factor in researchers' journal selection. When submitting to journals, the primary consideration is journal prestige, including impact factor, editorial board, and support from prestigious societies/institutions. These factors are generally considered beneficial for hiring, promotion, and funding applications. Since publication fees represent a relatively small portion of project costs, APC prices do not significantly influence researchers' choices. Researcher S. Khoo analyzed papers from 319 journals published by four commercial open access publishers, showing that higher APCs correlate with more published papers, but APC has minimal impact on authors' submission choices.

If traditional subscription fees were once the "gold mine" of academic publishing, then using research funds for open access publishing represents an even broader "gold mine" for the industry. Publishers' increasing APC prices have not affected authors' submission choices. Some publishers actively launch new open access journals based on existing subscription journals, driving up APCs and profiting accordingly. Due to unreasonable APC growth, publisher profits indirectly increase. Large publishers will concentrate on strengthening their pricing power. Funding agencies and libraries will also tend to reach open access publishing agreements with large publishers, though issues such as non-transparent APC pricing mechanisms and lack of binding mechanisms remain. From the perspective of Chinese government, universities, and research institutions, journal subscription fees are information resource construction costs for

libraries, while APCs collected belong to research funds. Although named differently, both are essentially academic journal funds from universities or research institutions. China should formulate targeted policies and measures based on actual national conditions to avoid publishers double-charging—collecting both subscription fees and APCs—thus preventing waste of public funds.

Implications for China

Current Status of Open Access in China

Li Kewei et al.'s survey shows that Chinese academic journals' open access can be divided into three models: (1) fully open access journals where papers are freely available immediately upon publication; (2) partially open access journals, a hybrid between traditional and open access publishing where authors choose whether to make papers open access; and (3) delayed open access journals where papers become freely available after an embargo period. Zhang Xinhe et al. investigated 533 journals indexed in CSSCI (2017-2018), finding 140 open access journals (26.27%) and 393 non-open access journals (73.73%). Among open access journals, 88 were fully open access (62.86%), 1 was partially open access (0.71%), and 51 were delayed open access (36.43%).

Liu Jun et al. found that as of December 2017, DOAJ indexed 159 Chinese journals, including 104 from mainland China and 55 from Hong Kong and Taiwan. China is actively promoting the open access process for academic journals.

Main pathways for full-text open access to Chinese academic journals include: (1) free full-text access through official journal websites, such as *Chinese Journal of Library Science*; (2) third-party free archiving platforms such as the National Social Science Database (NSSD), DOAJ, GoOA, Socolar open access resources, integrated open access resource retrieval systems, and open access search platforms; (3) free full-text access through WeChat public accounts, such as *Library and Information Service*; and (4) academic search platforms like Baidu Scholar, Bing Academic, and Google Scholar.

In China, the Chinese Academy of Sciences and the National Natural Science Foundation have declared that all publicly funded research projects must be self-archived in repositories and made open access within 12 months of publication. Meanwhile, NSTL is building an open repository for Chinese scientific research papers, accepting preprints and open archiving of published scientific papers in both Chinese and English. Currently, China is more suited to the open access repository model, i.e., based on third-party platforms that store funded papers for free download.

Implications of Plan S for Chinese Stakeholders

Under the influence of Plan S, the number of open access journals continues to grow. In an environment of scientific and technological innovation, open access, open data, and open science environments serve as new knowledge acquisition

methods and knowledge sharing concepts, receiving sustained attention from international and Chinese scientific communities. To accelerate the implementation of an innovation-driven national strategy and enable innovation entities to truly benefit from open access achievements, joint efforts from resource owners, research funding agencies, and resource users are needed. The following recommendations are proposed for journal publishing, library consortia, researchers, small society publishers, and data security.

5.2.1 Publishing Industry Innovation Practices Promote Open Access Plan S allows authors to publish in hybrid journals on the condition that publishers commit to converting them to fully open access journals by the end of 2024. Publisher Wiley has begun discussions and contract negotiations with university research funding agencies, with universities bearing publication costs. Elsevier will provide publishing guidelines to help authors publish papers meeting Plan S standards. Elsevier signed a two-year national-level open access agreement with the Norwegian Directorate for ICT and Joint Services in Higher Education and Research, allowing 90% of articles from Norwegian institutions to be published open access. In February 2019, Annual Reviews transitioned from subscription to open access. The renowned journal *The Lancet* supports Plan S's hybrid journal conversion route, providing AAM/VoR formats for open access archiving, ultimately forming open access journals.

China's open access journal publishing revenue models can be divided into supply-side and demand-side models from a market perspective. The supply-side model involves content producers or their agents paying, including input costs, affinity relationship income, external funding, donations, financing, non-cash service support, and partnership support. The demand-side model involves content consumers or their agents paying. Under Plan S, China's publishing industry should explore other revenue channels based on its own development, such as fund sponsorship, making funding agencies explicitly require project results to be published in open access journals and agreeing to pay publication fees from project funds, while seeking human and material support from universities to explore stable economic business models. Chinese academic publishers should unconditionally transfer copyrights of publicly funded papers to funding agencies and store them in institutional repositories for free download.

5.2.2 Changes in Library Consortium Procurement Policies Transformative agreements between library consortia and publishers are gradually gaining attention. Many library consortia are prioritizing open access publication in contracts with publishers, explicitly stating that contracts must be cost-moderate or at least control overall costs. Foreign library consortium procurement models are transitioning from FTE-based cost-sharing models to cost estimates based on article publication models, developing a "transformative cost-share model" to control overall funding costs. Cost allocation among consortium members is based on historical expenditures, overall budgets, and financial support data. China has not yet formulated procurement policies for library consor-

tium open access and can learn from European library consortium experiences, considering internal cost allocation and procurement plan development to meet researchers' needs, ensure open access resource quality, and maximize scientific benefits.

5.2.3 Impact on Researchers' Submission Choices Plan S sparked enthusiasm in 2018, but in reality, publication and citation status remain the primary criteria for evaluating academic achievements, with open science factors accounting for only a small proportion. For researchers, journal impact factor remains important. At the 2019 Open Science International Conference, the European University Association released the "Research Assessment in the Transition to Open Science" report, which collected the most comprehensive and up-to-date overview of European universities' scientific assessment practices, particularly during the transition to open science. The survey involved 260 institutions from 32 countries. Although Plan S implementation guidelines require evaluation based on research merit rather than publication venue, impact factor remains the main metric for measuring research outcomes in practice. The impact factor evaluation system has undergone over 40 years of commercial operation, while using open science as an evaluation metric is a concept proposed only in recent years, with many unknowns to explore.

Liu Jun's survey shows that as of December 2017, Web of Science Core Collection indexed 34 Chinese open access English journals, and Scopus indexed 79 Chinese open access English journals. Plan S no longer uses journal impact factor as an evaluation metric but focuses more on the intrinsic quality of academic achievements. In the open access environment, predatory journals aim to obtain high APCs, promising rapid publication for payment and providing false or incomplete peer review. Chinese researchers find it difficult to identify predatory journals when submitting in English, paying high APCs without receiving proper rights. Expensive APCs waste research funds and cause substantial capital outflow to foreign publishers, seriously affecting academic publishing, evaluation, and research itself. In 2014, NSTL promoted open access publishing, supporting the establishment of reasonable APC pricing and management mechanisms. In the open access environment, China should establish a "blacklist" of predatory journals and use multiple indicators to evaluate academic achievements.

5.2.4 Transformative Agreements Promote Small Society Publisher Open Access In promoting open access to scientific literature, large commercial publishers can absorb financial losses from some journals, but many small scientific societies publish only a few journals and struggle to operate. Transformative agreement negotiations are complex and time-consuming, which many small societies cannot afford, potentially making them indirect victims. Societies rely on subscription revenue from their journals—typically the most highly cited journals in their fields—to support academic activities. In September 2019, cOAlition S, UK Research and Innovation, the Wellcome Trust, and

professional publishers released a toolkit to accelerate Plan S and help society publishers transition to open access, assisting small society publishers in reaching agreements with libraries to protect revenue while ultimately eliminating subscriptions. In October 2019, the Microbiology Society announced two-year transitional pilot open access agreements with JISC and the Council of Australian University Librarians. Through these “publish and read” agreements, researchers from participating institutions can publish unlimited open access articles at unchanged costs. JISC represents 180 universities and research institutions and is negotiating with similar small society publishers, expecting to reach agreements with comparable societies such as Portland Press, International Water Association, and European Respiratory Society. Under Plan S, China has no relevant policies for small society publishers. Due to shortages of funding, talent, and technology, small society publishers face high investment and low returns in open access. China should formulate relevant policies based on their actual conditions.

5.2.5 Emphasizing Scientific Data Security In November 2019, Elsevier allowed Dutch scientists to publish open access articles in all its journals, including prestigious titles *Cell* and *The Lancet*, without increasing contract totals, on the condition that Dutch universities participate in a metadata pilot project. Essentially, Dutch universities exchanged data for open access. Elsevier and other major publishers are positioning themselves as data companies, providing services related to the scientific process. The agreement’s potential goal for data trials was described as “using this data to enrich and substantiate science policy.” S. Rijcke, Director of the Centre for Science and Technology Studies at Leiden University, responded that “the academic community cannot exchange data for high-impact subscription journals.” In April 2018, China promulgated the “Administrative Measures for Scientific Data,” emphasizing classification of scientific data by level and type and establishing corresponding review and supervision systems. Scientific data personnel must not engage in activities that compromise scientific data security. The Ministry of Science and Technology’s “Scientific Data Sharing Project Plan” emphasizes open sharing of scientific data. In the open science trend, the publishing industry and relevant departments should improve scientific data security management policies to protect researchers’ unpublished data. Meanwhile, developing countries have weaker information infrastructure than developed countries and should pay greater attention to data security to provide solid guarantees for national scientific and technological innovation, socio-economic development, and national security maintenance.

Western developed countries are adopting diversified approaches to promote open access journal publishing. For example, the UK uses JISC for overall coordination and negotiation with publishers while building infrastructure, while the US allows higher education institutions to advance independently, supporting multiple forms of open access. China should strengthen open science infrastructure and open access platform construction, enhance social and researcher

participation and benefit in open access, and increase utilization of already open access content.

The gradual development of the open access movement and open science internationally is promoting the establishment of China's open access policies and mechanisms. Currently, some Chinese publishers have not yet proposed open access requirements, and some researchers have insufficient understanding of open science. China should formulate open access funding policies based on national conditions, optimize funding investment, strengthen implementation of transformative agreements, promote open access among journal publishing, library consortia, higher education institutions, societies, and small publishers, and establish effective operational supervision mechanisms to ensure the healthy operation of China's open access movement.

References

- [1] Open access and plans: 5 key activities [EB/OL]. [2020-02-20]. <https://www.coalition-s.org/open-access-and-plan-s-5-key-activities/>.
- [2] US Patient and Disease Advocacy Organizations. A letter to President Trump [EB/OL]. [2020-03-08]. <https://sparcopen.org/wp-content/uploads/2020/01/Organizations-Open-Access-Letter.pdf>.
- [3] Library and Information Affairs. Another US university says goodbye to Elsevier! List of institutions canceling "big deals" this year [EB/OL]. [2020-03-11]. <https://mp.weixin.qq.com/s/01Ze8ShAO7Y2e-72hcmQKw>.
- [4] Overview [EB/OL]. [2019-12-02]. <https://sparcopen.org/our-work/big-deal-cancellation-tracking/>.
- [5] CHAWLA D. Open-access row prompts editorial board of Elsevier journal to resign [EB/OL]. [2020-03-11]. <https://www.nature.com/articles/d41586-019-00135-8>.
- [6] LINDSAY M. Editorial mutiny at Elsevier journal [EB/OL]. [2020-03-11]. <https://www.insidehighered.com/news/2019/01/14/elsevier-journal-editors-resign-start-rival-open-access-journal>.
- [7] SCEL C supports the University of California's push for open access to research [EB/OL]. [2020-03-11]. <https://scelc.org/about/news/press-releases/SCELC-Supports-the-University-of-California%27s-Push-for-Open-Access-to-Research>.
- [8] Radical open-access plan could spell end to journal subscriptions [EB/OL]. [2020-03-10]. <https://sfedit.net/radical-open-access-plan-could-spell-end-to-journal-subscriptions/>.
- [9] Open access is foundational to the scientific enterprise [EB/OL]. [2020-03-11]. <https://www.coalition-s.org/why-plan-s/>.

- [10] Fan H, Wang H. European open access policies and their implications: Taking “Plan S” as an example [J]. *Library Science Research*, 2019(9): 37-43, 73.
- [11] ANDERSON R. The tyranny of unintended consequences: Richard Poynder on open access and the open access movement [EB/OL]. [2019-12-12]. <https://scholarlykitchen.sspnet.org/2019/11/25/the-tyranny-of-unintended-consequences-richard-poynder-on-open-access-and-the-open-access-movement/>.
- [12] Intellectuals. Open access controversy reignites: Why did over a hundred academic publishers write to Trump? [EB/OL]. [2019-12-02]. <http://zhishifenzi.com/depth/7899?category=multiple>.
- [13] Cui H. Promotion strategies for Chinese university institutional repositories under the “Double First-Class” background [J]. *Library Science Research*, 2019(8): 70-78.
- [14] E Lijun. Investigation and enlightenment of digital scholarship support in some American university libraries [J]. *Library and Information Service*, 2017, 61(10): 74-80.
- [15] cOAlition S response: Hope journals and publishers will take the opportunity of “transformative journals” to boldly reform [EB/OL]. [2020-03-11]. <https://mp.weixin.qq.com/s/z7ThCoR2oSqlwfmNjIhJMA>.
- [16] New policy for open access “Plan S” [EB/OL]. [2019-12-07]. <http://wap.sciencenet.cn/home.php?mod=space>
- [17] Brief thoughts on Plan S initiated by the European Research Council [EB/OL]. [2019-12-07]. <http://blog.sciencenet.cn/home.php?mod=space&uid=549158&do=blog&quickforward>
- [18] Wang C. Plan S for open access: Background, content, and impact [J]. *Digital Library Forum*, 2019(7): 9-16.
- [19] Zheng A. Research on academic open access publishing led by research funding alliances: Taking Plan S as an example [J]. *China Publishing*, 2019(17): 64-68.
- [20] Eigenfactor index of open access fees [EB/OL]. [2020-03-11]. <http://www.eigenfactor.org/projects/openAcc>
- [21] Norwegian research institutions have decided not to renew their agreement with Elsevier [EB/OL]. [2019-12-04]. <https://www.mynewsdesk.com/no/unit/pressreleases/norwegian-research-institutions-have-decided-not-to-renew-their-agreement-with-elsevier-2846284>.
- [22] Hu S. Open access: Determination and reality—OA proportion and country statistics of SCI journals [EB/OL]. [2020-04-17]. <http://blog.sciencenet.cn/blog-980214-1082503.html>.
- [23] Jia W. EU launches “Plan S” to strongly promote open access to publicly funded scientific publications [J]. *Global Science, Technology and Economy Outlook*, 2019, 34(2): 20-23.

- [24] Nature boss warns Plan S could put journal out of business [EB/OL]. [2019-12-04]. <https://www.timeshighereducation.com/news/nature-boss-warns-plan-s-could-put-journal-out-of-business>.
- [25] Qu J. Industry executives answer questions on academic publishing trends [N]. China Publishing & Media Business Daily, 2020-01-07(34).
- [26] cOAlition S welcomes its first African member and receives strong support from the African Academy of Sciences [EB/OL]. [2019-12-04]. <https://www.coalition-s.org/coalition-s-welcomes-its-first-african-member-and-receives-strong-support-from-the-african-academy-of-sciences/>.
- [27] World Health Organization and TDR join cOAlition S to support free and immediate access to health research [EB/OL]. [2019-12-04]. <https://www.coalition-s.org/who-joins-coalition-s/>.
- [28] PRICE G. Report: “Major book publishers sue Amazon’s audible over new speech-to-text feature” [EB/OL]. [2019-12-24]. <https://www.infodocket.com/2019/08/23/report-major-book-publishers-sue-amazons-audible-over-new-speech-to-text-feature/>.
- [29] Xu J, Ma Q. A field theory perspective on Plan S and its impact [J]. Publishing Science, 2019, 27(4): 99-104.
- [30] Tang Y. New details in European open access plan [N]. China Science Daily, 2019-06-06(003).
- [31] Principles and implementation [EB/OL]. [2019-12-04]. <https://www.coalition-s.org/principles-and-implementation/>.
- [32] Hu S. European dream: “Science without paywalls” [N]. Science and Technology Daily, 2018-09-14(1).
- [33] EDDY T. Plan S motivations of for-profit publishers [EB/OL]. [2019-12-02]. <http://science.sciencemag.org/content/363/6426/462.2>.
- [34] HARINGTON R. Why scholarly societies are vitally important to the academic ecosystem [EB/OL]. [2019-12-24]. <https://scholarlykitchen.sspnet.org/2019/10/03/why-scholarly-societies-are-vitally-important-to-the-academic-ecosystem/>.
- [35] CLARKE M. Plan S impact on society publishers [EB/OL]. [2019-12-14]. <https://scholarlykitchen.sspnet.org/2018/12/05/plan-s-impact-on-society-publishers/>.
- [36] Researchers sign petition backing Plan S to end paywalls [EB/OL]. [2019-12-24]. <https://www.nature.com/articles/d41586-018-07632-2>.
- [37] KHOO S. The gold rush: Why open access will boost publisher profits [EB/OL]. [2019-12-04]. <https://blogs.lse.ac.uk/impactofsocialsciences/2019/06/04/the-gold-rush-why-open-access-will-boost-publisher-profits/>.
- [38] SIVERTSEN G, Sun Y, Ding N. Observations and reflections on transitioning to open access publishing models [J]. Library and Information Science Knowledge, 2019(4): 113-121.

- [39] Li K, Le L, Zhang Y. Have Chinese academic journals entered the open access era?—Based on CSCD and CSSCI source journals [J]. *Library Research*, 2019, 49(6): 71-77.
- [40] Zhang X, He X. Research on open access policy system and content of Chinese academic journals [J]. *Library Forum*, 2019, 39(4): 50-59.
- [41] Liu J, Zhang J. Current status of Chinese open access journals and library countermeasures [J]. *Library Journal*, 2019, 38(2): 64-68.
- [42] Guo Z. Exploration of innovative literature resource sharing models in the new era—Resource construction and service optimization of the National Social Science Documentation Center [J]. *Journal of Information Resources Management*, 2019, 9(1): 114-121.
- [43] Here are 10 ways in which we support open access [EB/OL]. [2019-06-25]. <https://www.elsevier.com/about/open-science/open-access/supporting-open-access>.
- [44] UC Office of the President. UC terminates subscriptions with world's largest scientific publisher in push for open access to publicly funded research [EB/OL]. [2019-07-29]. <https://www.universityofcalifornia.edu/press-room/uc-terminates-subscriptions-worlds-largest-scientific-publisher-push-open-access-publicly>.
- [45] The Lancet Group. Plan S: The final cut [J]. *Lancet*, 2019, 393(10188): 2276.
- [46] Wang Y, Wang Y, Ji F, et al. Revenue and business models of open access publishing [J]. *Chinese Journal of Scientific and Technical Periodicals*, 2016, 27(8): 863-873.
- [47] HINCHLIFFE L. Will transformative agreements unravel library consortia? [EB/OL]. [2019-07-25]. <https://scholarlykitchen.sspnet.org/2019/05/20/transformative-agreements-unravel-library-consortia/>.
- [48] Springer Nature renews three-year open access agreement with Austrian Academic Library Consortium [EB/OL]. [2020-03-10]. https://mp.weixin.qq.com/s/yr2bu9tmO4v_{X7}-sCMtFKg.
- [49] European University Association. 2019 research assessment in the transition to open science [EB/OL]. [2020-03-10]. <https://www.slideshare.net/EurUniversityAssociation/2019-research-assessment-in-the-transition-to-open-science>.
- [50] Yuan Z, Zhang H. Current status and prospects of predatory journal research at home and abroad [J]. *Chinese Journal of Scientific and Technical Periodicals*, 2019, 30(11): 1135-1141.
- [51] Report and toolkit to support learned society publishers transition to immediate open access [EB/OL]. [2020-03-10]. <https://www.coalition-s.org/spa-ops-project/>.

[52] Microbiology Society and JISC agree two-year open access deal [EB/OL]. [2020-03-10]. <https://microbiologysociety.org/news/society-news/microbiology-society-and-jisc-agree-two-year-open-access-deal.html>.

[53] Yin Y. Discussion on current status and development ideas of digital publishing for small and medium academic publishers [J]. *Journal of News Research*, 2018, 9(17): 206-207.

[54] KNECHT D. Leaked document on Elsevier negotiations sparks controversy [EB/OL]. [2020-03-10]. <https://www.scienceguide.nl/2019/11/leaked-document-on-elsevier-negotiations-sparks-controversy/>.

[55] KNECHT D. Elsevier bids 100% open access [EB/OL]. [2019-07-25]. <https://www.scienceguide.nl/2019/11/elsevier-biedt-100-open-access-in-ruil-voor-metadata/>.

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Note: Figure translations are in progress. See original paper for figures.

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