

The Evolution and Driving Factors of Open Access Plan S and Its Implications for China: Post-print

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Abstract

[Purpose/Significance] From the stakeholder perspective of the scientific community, this study analyzes the policy evolution of Plan S and its implications for the development of open access practices in China. [Method/Process] Through literature investigation and content analysis, we trace the evolutionary trajectory of Plan S, examining the temporal nodes, content, and related policies of landmark events; we also review the latest developments in Plan S, including its monitoring framework for impacts on the scientific community, rights retention policies, and the new diamond open access model. [Results/Conclusion] The study focuses on in-depth policy interpretation and uncovers underlying motivations, revealing that the adoption of Plan S by the scientific community is influenced by factors such as seniority, nationality, and discipline; that the scientific community encounters difficulties in green open access archiving; faces challenges in identifying “predatory journals”; and experiences impacts on free choice in academic publishing. Finally, we propose measures including establishing dedicated open access officers, formulating APC-related policies, strengthening quality management of journal publishing institutions, and promoting the normalized development of institutional repositories, aiming to provide reference and guidance for open access practices in China.

Full Text

The Development and Motivations of Plan S and Its Implications for Open Access Practice in China

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Abstract: *[Purpose/Significance]* From the perspective of the scientific community as a key stakeholder, this study analyzes the policy evolution of Plan

S and its implications for the development of open access practices in China. *[Method/Process]* Using literature research and content analysis methods, we trace the evolutionary trajectory of Plan S, examining the timing, content, and relevant policies of landmark events. We also review the latest developments in Plan S, including its monitoring framework for assessing impacts on the scientific community, rights retention policy, and new models for diamond open access. *[Result/Conclusion]* Through in-depth interpretation of policies and exploration of underlying motivations, we find that adoption of Plan S by the scientific community is influenced by researcher seniority, nationality, and discipline. Additional challenges include difficulties with green open access archiving, identification of “predatory journals,” and constraints on academic publishing freedom. Finally, we propose measures including establishing open access professionals, formulating APC-related policies, strengthening quality management of journal publishers, and promoting the normalized construction of institutional repositories to provide reference for China’s open access practice.

Keywords: Plan S; scientific community; open access; motivation

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Introduction

Reducing barriers to accessing academic papers and maintaining a sustainable high-quality publishing system are critical concerns for the scientific community in the era of open science. However, tensions between academic publishers and research institutions—two parties directly involved in open access practice within the scientific community—have become increasingly acute. Some institutional users have responded to publishers’ substantial fees and continuous large-scale price increases by terminating contracts, often due to budget adjustments. For example, in 2017, German institutions demanded that Elsevier permanently provide full-text access to works by German researchers and emphasized fair pricing. On September 4, 2018, with support from the European Commission and the European Research Council, the open access research funding coalition cOAlition S was launched, initiating Plan S to help scientists and the public access publicly funded research outcomes, break down paywalls for publications, and more actively diminish the dominant position of subscription journals in the scholarly communication system. According to cOAlition S, Plan S requires that from 2021 onward, all research results funded by public or private sources through national, regional, and international research councils and funding bodies must be immediately available in open access journals, on open access platforms, or in open access repositories without embargo periods.

Ultimately, approximately 300 German and Swedish institutions refused to renew their contracts with Elsevier, leaving thousands of scholars unable to access the latest content in publisher journals. In 2018, Florida State University in the

United States re-examined and evaluated its subscription contracts with Elsevier over the past 20 years, finding that it had been overcharged compared to other public universities in Florida. Consequently, some U.S. institutions, including Florida State University, have canceled major subscription agreements with Elsevier while maintaining access to a small number of paid journals due to cost concerns. On June 16, 2020, the University of California announced a memorandum of agreement with Springer Nature for the largest open access agreement in the United States, making approximately 10% of U.S. research output freely accessible worldwide. After the University of California signed this contract with Springer Nature but before implementing the multi-party payment mechanism, UC authors could publish open access articles in Springer Nature's "hybrid journals" without paying additional fees. Currently, an increasing number of publishers are signing "Read & Publish" (RAP) agreements with university consortia, bundling subscription fees and open access publication costs into a single contract.

2. Evolution of Plan S

Open access to scientific data and publications constitutes a fundamental element of open science. However, access to some publications remains restricted by "paywalls." EU member states are committed to making publicly funded academic research accessible. Building on this foundation, on September 4, 2018, 11 national research funding agencies formed cOAlition S and launched Plan S. On November 27, 2018, cOAlition S released the "Plan S Implementation Guidance: From Principles to Practice," proposing three implementation pathways: (1) publishing in open access journals/platforms; (2) depositing the final published version or final peer-reviewed manuscript in open access repositories without embargo; and (3) allowing publication in "hybrid" journals only if they have transformation agreements. Subsequently, cOAlition S began exploring business models for learned societies that align with Plan S principles.

To promote diversified open access scholarly communication and understand stakeholder recommendations for Plan S, on February 20, 2019, approximately 600 individuals and organizations from over 40 countries—including researchers, librarians, publishers, editors, universities, societies, research funders, and other interested citizens and groups—provided feedback on the Plan S implementation guidance to cOAlition S. Based on this input, on May 31, 2019, cOAlition S released the "Revised Plan S Implementation Guidance," making significant changes compared to the initial version regarding effective dates, APCs, licensing agreements, evaluation criteria, and transition arrangements. cOAlition S has since released related measures to advance Plan S.

On July 10, 2020, cOAlition S established a monitoring framework to track the positive and negative impacts of Plan S policies on the scientific community, particularly on researchers. Subsequently, cOAlition S released the "Rights Retention Strategy" and began exploring diamond open access models. Since its launch, Plan S has attracted close attention from the scientific community,

research institutions, libraries, and publishers. Throughout its policy evolution, Plan S has consistently centered on the interests of the scientific community, conducted large-scale stakeholder consultations, launched revised guidance, prioritized the concerns of early-career researchers, gradually adjusted relevant policies, developed monitoring frameworks, and introduced rights retention policies.

In summary, compared to international developments, China has relatively few reports and studies on Plan S, lacking in-depth analysis of its policy development and underlying motivations. Therefore, this study focuses on the reasons for Plan S policy adjustments and their potential effects. To analyze the motivations behind this evolution, we examined the timing of specific landmark events and their associated policies, with results summarized in Table 1 .

3. Latest Developments in Plan S

3.1 Monitoring Framework for Plan S Impact on the Scientific Community To initiate dialogue between stakeholders and assess Plan S implementation effects, cOAlition S established a monitoring framework on July 10, 2020, to track the impacts of Plan S policies. The framework development team comprises two types of organizations: (1) cOAlition S funders, including the French National Research Agency (ANR), American Roentgen Ray Society (ARRS), Science Europe, UK Research and Innovation (UKRI), and Science Foundation Ireland (SFI); and (2) early-career researcher groups, including the European Council of Doctoral Candidates and Junior Researchers (EuroDoc), Global Young Academy (GYA), Marie Curie Alumni Association (MCAA), and Young Academy of Europe (YAE), ensuring the framework incorporates broad perspectives and expertise.

The framework's primary information sources include various data from Plan S funding agencies and other available datasets to capture early signals of changes in publishing behavior and issues encountered by the scientific community. Although Plan S initially focused on the connection between publishing pathways and career development, it may be influenced by other domains such as costs and resources, funders, and scholarly publishing. Therefore, the framework establishes monitoring points and indicators across six dimensions: career assessment and journal selection, costs and resources, funders, academic publishing, communication methods, and research activities. This creates a standardized monitoring system to track Plan S impacts on the scientific community through data from key processes, enabling timely understanding of implementation effects and correction of negative impacts during implementation. Details are shown in Figure 1 [Figure 1: see original paper].

3.2 Rights Retention Strategy On July 15, 2020, cOAlition S released the "Rights Retention Strategy," enabling funded researchers to publish in their journals of choice (including subscription journals) while making their work compliant with Plan S. Previously, publishers required authors to sign exclusive publication agreements that restricted their ability to choose open access for

their research outputs. Currently, cOAlition S is organizing a series of webinars for publishers and journal editors to introduce the Rights Retention Strategy implementation.

The strategy's implementation process is detailed in Table 2. When submitting manuscripts, researchers must state: "This research was funded in whole or in part by [cOAlition S organization name] [grant number]. For the purpose of open access, the author has applied a CC BY public copyright license to any Author Accepted Manuscript version arising from this submission." cOAlition S recommends Creative Commons licenses, requiring CC BY 4.0 by default, with CC BY-SA and CC0 as acceptable alternatives. CC BY-ND may only be assigned if explicitly requested by the author, justified to their funder, and approved.

The Rights Retention Strategy primarily addresses the challenge that the scientific community cannot publish in subscription journals without transformation agreements under Plan S. It allows funded researchers to publish in subscription journals while receiving cOAlition S funding. Following the strategy's release, publishers, libraries, societies, and researchers have given it high priority and support. On July 16, 2020, Springer Nature announced that the Rights Retention Strategy would provide researchers with a new way to publish in *Nature* and most other journals in compliance with Plan S. Chris Banks, Head of Library Services at Imperial College London, tweeted that this was "good news, especially for funded researchers concerned that journal choice might be restricted by current publisher policies." Currently, 22 cOAlition S organizations support the Rights Retention Strategy, including the Royal Society and the Microbiology Society, which have granted these rights to their authors.

3.3 Exploring Diamond Open Access Models Diamond open access refers to journals that charge no APCs to authors and are free for both readers and authors. Such journals and platforms serve specific disciplinary research areas in various languages and meet different regional publishing cultural needs. Currently, academic understanding of the value and impact of diamond open access journals remains limited.

To better understand these journals, cOAlition S conducted a survey of diamond open access journals and platforms from March 27 to August 25, 2020. The survey covered three main aspects: (1) surveying editorial teams of open access journals that charge no author fees; (2) investigating diamond open access journals not covered by DOAJ; and (3) developing materials in six languages (English, French, German, Italian, Spanish, and Portuguese) to promote the survey and gather more information. cOAlition S and other stakeholders hope to develop effective policies and funding mechanisms to better support diamond open access journals and platforms. Funded by Science Europe, the study plans to report progress regularly to the public.

4. Motivations Behind Plan S Evolution

4.1 Divergent Attitudes Toward Plan S Among Researchers at Different Career Stages Researchers can be categorized as early-career researchers (ECRs) or established researchers. cOAlition S emphasizes evaluating research based on intrinsic value rather than journal impact factors or prestige. However, ECRs prioritize publishing in high-impact or prestigious journals to positively influence promotion and career prospects. Therefore, publishing in subscription journals without signed transformation agreements may prevent ECRs from obtaining Plan S funding.

On July 15, 2020, the European Research Council announced its withdrawal of support for Plan S, emphasizing that Plan S particularly disadvantages early-career researchers, researchers in countries with limited funding opportunities, and those working in fields where open access policies are difficult to implement. The Council needed to maintain fairness between academia and European nations, prompting its exit from Plan S. Following cOAlition S's release of the Rights Retention Strategy, attitudes among early-career researchers toward Plan S have been easing.

4.2 Inequitable Access to APC Funding Across Countries Plan S's open access model shifts publication costs to authors. In many world regions, scientific research remains underdeveloped, hindering local economic development through innovation, and researchers in economically disadvantaged areas struggle to obtain funding. Researchers in developed countries have more funded publication opportunities, while those in poorer regions may be excluded from open access, potentially widening the research gap between high-income and low- and middle-income countries.

Lina Kamenji, a chemist at Uppsala University in Sweden, noted that many scientists cannot afford publication fees unless they come from wealthy institutions. For some researchers, including those in affluent countries, APC costs may constitute a substantial portion of their research budgets. Consequently, cOAlition S is actively exploring diamond open access models so that authors may no longer need to pay APCs, thereby promoting equity in international scientific research.

4.3 Disciplinary Differences in Perspectives on Plan S Different disciplines have varying publishing conventions. Researchers in computer science, physics, and economics support early data access and Plan S. Richard Poynder specifically noted that physicists accept online preprint posting, an established practice in physics based on preprints.

However, due to longer research cycles in humanities, social sciences, and basic natural sciences, most researchers in these fields do not yet support Plan S. For example, researchers from the Royal Historical Society believe that at most 20% of humanities research funding in the UK comes from external grants covering

APCs and book publication fees, and few history journals can comply with Plan S. According to P. Davis' s 2013 study on journal usage, mathematics represents an extreme case in the lifecycle of journal articles. Robert Harington of the American Mathematical Society believes Plan S standards cannot apply to all learned societies.

4.4 Difficulties with Green Open Access Archiving The green open access model relies on universities to establish repositories where the final published version (Version of Record, VoR) can be deposited without embargoes imposed by traditional publishers and APC-related intellectual property restrictions. Current self-archiving repositories include arXiv, bioRxiv, SSRN, and COAR. However, only 20-25% of researchers actually self-archive their work. Institutional repositories also suffer from poor discoverability through search engines like Google Scholar. Moreover, green archiving requires researchers to deposit less discoverable and less attractive versions of their work, adding to their workload.

Addressing these challenges, cOAlition S surveyed repositories to better meet Plan S requirements. On June 17, 2020, cOAlition S surveyed 16 repository software platforms from the Confederation of Open Access Repositories (COAR). Plan S requires repositories to be highly discoverable on the internet and enable funders to monitor open access compliance. Results showed most repositories already meet Plan S requirements, allowing AAM or VoR to be deposited in COAR from the publication date. Moving forward, cOAlition S will continue collaborating with COAR to ensure repositories are well-represented and develop detailed implementation guidelines for Plan S' s green archiving pathway.

4.5 Challenges in Identifying Predatory Journals Under Plan S' s hybrid journal transformation agreements, “predatory journals” or “predatory publishers” may emerge during the transition to fully open access journals. On May 31, 2020, cOAlition S released the revised implementation guidance, creating a “whitelist” to help avoid predatory journals. Predatory journals exploit the gold open access model for easy profit, often bypassing rigorous peer review and severely affecting scientific development. Jeffrey Beall argues that predatory journals are associated with open access—after adopting APC models, many open access journals in developing countries have gradually shifted toward ignoring paper quality and publishing for payment.

To meet open access needs with limited funding, researchers may be tempted to publish in questionable predatory open access journals. Cabells, a database for identifying deceptive and predatory journals, listed 12,000 journals in its “blacklist” as of November 2019. The persistent pressure to publish globally makes such blacklists valuable for researchers when submitting their work.

4.6 Impact on Academic Publishing Freedom Journal prestige influences author submission intentions. Plan S requires authors to publish only

in journals/platforms offering free sharing services or those with transformation agreements, excluding subscription journals. In the revised Plan S, funders committed to evaluating research outcomes without considering publication factors (such as impact factors or journal prestige), emphasizing the value of the research itself. The subsequent Rights Retention Strategy also enables funded researchers to publish in subscription journals. However, for high-quality subscription journals that do not agree to the Rights Retention Strategy, the scientific community still cannot publish Plan S-compliant research, inevitably affecting research dissemination. Thus, whether journals comply with Plan S and its supplementary policies—or whether they are open access—has become a new metric in journal evaluation systems, potentially compromising the scientific community's traditional stance that journal quality is key to ensuring research credibility.

5. Implications for China's Open Access Practice

Plan S policy evolution has profound implications for China's open access development. We analyze four key aspects: establishing open access professionals, formulating APC policies, strengthening journal quality management, and promoting normalized construction of institutional repositories.

5.1 Establishing Open Access Professionals As Plan S policies evolve, China's open access publishing is accelerating. Research service institutions are strengthening training and professional guidance and gradually establishing dedicated open access professional positions. In 2016, the National Science Library of the Chinese Academy of Sciences (CAS) established open access professional positions. In 2018, the National Science and Technology Library (NSTL) added a special tasks department to promote open access research and practice in China. In 2020, NSTL launched the "OA Research Promotion" special project to track international open access trends and conduct negotiations.

In December 2020, NSTL, CAS National Science Library, and the Specialized Library Society of China Library Association organized the first Open Access Professionals Training Camp, focusing on issues of concern to domestic institutions: open access policy formulation and implementation, infrastructure construction and operation, economic cost assessment of open publishing transitions, rights management, and service innovation. The training included knowledge instruction, case analysis, and practical exercises.

China's documentation centers and libraries should establish open access professionals based on actual conditions to continuously track international open access developments, explore development patterns, and build multi-pronged promotion mechanisms. This would facilitate research and formulation of open access policies, advance construction and pilot demonstrations, conduct targeted international open publishing transition cooperation, improve promotion depth, strengthen researcher collaboration, and enhance infrastructure, platforms, and

tools to increase awareness and participation in open access among researchers and the public.

5.2 Formulating APC-Related Policies In October 2014, CAS National Science Library's "Guidelines for Funding Open Access Publications" stipulated that "APC pricing mechanisms must be transparent and reasonable, with group discounts provided, and journals must offer APC discounts to CAS authors under consortium funding." In February 2020, China's Ministry of Science and Technology and Ministry of Finance issued "Measures for Breaking the 'Paper-Only' Bad Orientation in Science and Technology Evaluation (Trial)," stating that for single-paper publication expenses exceeding 20,000 RMB, the corresponding author or first author's institution must conduct a necessity review through its academic committee before the expense can be charged to national science and technology program funds. In August 2020, CAS National Science Library launched APCCheck, a platform for querying and assessing APC reasonableness, providing authors with references for publishing open access papers. The platform uses verified positive correlations between APCs and journal impact to analyze complex APC situations encountered by authors.

China's science and technology management departments should timely track domestic and international APC developments, formulate relevant policies, coordinate overall efforts, and comprehensively establish policies, mechanisms, and infrastructure environments that promote open access. This includes establishing research, release, and monitoring mechanisms for open access policies, implementing APC price caps, negotiating and regulating APC prices, and optimizing payment mechanisms. Focus should be placed on monitoring APCs of concern in open access journal publishing to support supervision of research fund usage.

5.3 Strengthening Quality Management of Journal Publishers In 2014, CAS National Science Library's funding guidelines stated that "journals not included in industry-recognized lists of fraudulent journals, without serious management negligence, without extraordinary retraction cases, and without intrusive marketing practices" were necessary funding conditions. In 2019, *Nature* published "Five Ways China Must Cultivate Research Integrity," noting that "the growth rate of China's scientific productivity does not match its capacity to curb research misconduct. Between 1978-2017, China accounted for 8.2% of global papers but 24.2% of retractions." In February 2020, China's Ministry of Science and Technology and Ministry of Finance stipulated that "paper publication expenses in journals on 'blacklists' or warning lists cannot be charged to national science and technology program funds." In December 2020, CAS's Journal Citation Reports team officially released the "International Journal Warning List (Trial)," which "identifies academic journals with potential quality problems by comprehensively evaluating publication volume, author internationalization, rejection rates, APCs, journal transcendence indices, self-citation rates, and retraction information,"

contributing to a healthy ecosystem for China's research development.

With increasing exposure of research misconduct, issues such as inadequate quality management of academic journals have attracted attention from China's scientific community. Differences in the roles of various journal publishers in open science must be addressed to guard against predatory journals through blacklists and warning lists, meeting challenges in open access practice exploration.

China should strengthen quality management of journal publishers. Research funding agencies, societies, and library documentation institutions should represent the community in negotiating with publishers to secure more academic resources. For emerging issues in developing publishing ecosystems, libraries and research funding agencies must conduct long-term, comprehensive tracking and research.

5.4 Promoting Normalized Construction of Institutional Repositories

Academic search engines such as Baidu Scholar, Bing Academic, and Google Scholar have become primary tools for retrieving scholarly outcomes. However, most Chinese institutional repositories lack sufficient openness and internet visibility, existing in isolated silos. Low recognition, participation, and priority among institutions and researchers have become major constraints, making it difficult for institutional repositories to meet green open access storage requirements and affecting scholarly sharing and communication.

To meet researchers' green open access storage needs and facilitate public access to latest knowledge, China's institutional repositories should actively integrate into international development and applications, enhancing research transparency and providing institutionalized, regular support for research management and evaluation. Documentation centers and libraries should incorporate repository construction into their routine work systems with clear responsibilities. They should promote preservation of researchers' academic outcomes, recommend green open access storage models, and provide discovery, access, and sharing services to the public.

Conclusion

As an academic communication model, open access enables broad sharing and dissemination of the scientific community's research outcomes. From Plan S's launch to implementation, cOAlition S has consistently centered on the scientific community, actively addressing stakeholder concerns, continuously revising and improving policies, and seeking the most suitable implementation pathways.

As a major country in research investment and output, China's participation is indispensable for international actions toward comprehensive open access in academic journals. China has a responsibility to actively participate in building new international academic communication environments and rule-making. However, China's open access movement still faces severe challenges. Open

access action plans require not only research funding agencies but also other stakeholders (scientific community, universities, research institutions, libraries, journal publishers, institutional repositories, etc.) to take joint action. In the future, China should establish effective open access operation and supervision mechanisms, promote timely sharing of scientific and technological information, and lay the foundation for implementing an innovation-driven national development strategy.

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The Development and Motivation of the Plan S to the Practice and Inspiration of Open Access in China

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Abstract: *[Purpose/significance]* From the perspective of the researchers, this study empirically analyzed the changes and differences of the policies for the Plan S. In order to inspire the practice of open access in China. *[Method/process]* It used the method of literature research and content analysis. Based on the development of Plan S, we analyzed the content of the target policy. We focused on the recent new, including monitoring the effects of Plan S, rights retention strategy and Diamond Open Access. *[Result/conclusion]* Focus on the deep interpretation of the policy and dig the internal motivation, the Plan S are affected by qualifications, countries, subjects, the difficulty of the Green Open Access and the difficulty to distinguish predatory journal for the researchers. Therefore, setting up Open Access professional staff, formulating APC policy, reinforcing quality management of journals and promoting the construction of institutional repository. These policies of the Plan S may have positive influence on the policies of China.

Keywords: Plan S; scientific community; open access; motivation

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

Source: ChinaXiv –Machine translation. Verify with original.