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Analysis and Prospects of Preprint Platform Development under Open Science: Postprints

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Abstract

Objective: The open science movement has driven the transformation and reshaping of the academic publishing ecosystem, representing a significant trend in global scientific development. Open access platforms, exemplified by preprint platforms, serve as an important means of academic communication, with the number of such platforms continuously increasing. **Method:** The emergence of preprint platforms has endowed the publishing ecosystem chain, including journals and books, with a richer structure and more diverse roles. It can be said that this will foster more abundant knowledge service formats and bring new opportunities. The development of preprint platforms plays a crucial hub role in building world-class innovation highlands and gathering first-class innovation elements. **Results:** This article conducts a comparative analysis of the characteristics of domestic and international preprint platforms, summarizes the existing problems of domestic preprint platforms, and based on this, proposes targeted development pathways. **Conclusion:** Domestic preprint platforms can achieve further development by adopting approaches such as reshaping promotional concepts and open cooperation with academic resources.

Full Text

ChinaXiv Partner Journal: Analysis and Prospects for Preprint Platform Construction Under Open Science

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Abstract

Purpose: The open science movement is driving transformation and reshaping of the academic publishing ecosystem, representing a crucial global trend in scientific development. Preprint platforms, as a key form of open access platforms for academic communication, are rapidly increasing in number. **Method:** The emergence of preprint platforms has enriched the structure and roles within the publishing ecosystem, including journals and books, promising to create a more diverse knowledge service industry and bring new opportunities. The development of preprint platforms plays a pivotal role in building world-class innovation hubs and aggregating first-class innovation elements. **Results:** This article conducts a comparative analysis of domestic and international preprint platform characteristics, summarizes existing problems in domestic platforms, and proposes targeted development pathways. **Conclusion:** Domestic preprint platforms can further develop through conceptual reshaping and promotion, as well as open cooperation with academic resources.

Keywords: preprint platform; scientific journal; open science; academic publishing; arXiv

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The preprint-based service model is becoming a breakthrough point in the development of global academic communication structures. At the 2020 Scientists' Symposium, General Secretary Xi Jinping emphasized the need to "develop first-class academic journals and various academic platforms, and strengthen domestic and international academic exchanges." The Fifth Plenary Session of the 19th CPC Central Committee adopted the "Proposal of the CPC Central Committee on Formulating the 14th Five-Year Plan for National Economic and Social Development and the Long-Range Objectives Through the Year 2035," explicitly identifying "building a national high-end exchange platform for scientific research papers and scientific and technological information" as a key task for "strengthening national strategic scientific and technological capabilities." China's scientific and technological strength is at a critical juncture, transitioning from quantitative accumulation to qualitative leap, and from isolated breakthroughs to systematic capability enhancement. Vigorously strengthening the construction of world-class scientific and technological journals is of strategic significance for advancing the national scientific and technological innovation system, seizing the initiative and dominance in science and technology, deeply participating in global scientific and technological governance, and moving toward the center of the world scientific stage to become a major global science and innovation hub. In 2021, UNESCO adopted the "Recommendation on Open Science," which states that open science should support the needs of the entire scientific com-

munity, different research groups and scholars, as well as the broader public and knowledge holders beyond traditional scientific circles. Establishing an international first-class academic data operation and service platform is the necessary path for China to build open science.

General Secretary Xi Jinping has emphasized: “Our scientific and technological workers should write their papers on the land of our motherland.” The national high-end exchange platform for scientific research papers shoulders the mission of attracting domestic papers to be published domestically. Currently, as cultural system reform advances, information technology develops rapidly, and media formats become increasingly diverse, competition in the media market is intensifying. Faced with complex and changing external circumstances, academic communication models represented by preprints are becoming breakthrough points in the development of global academic communication structures. Media organizations must fully utilize technological development achievements and focus on developing emerging media forms to forge a broader development path. The emergence of preprints enables rapid exchange of research findings among scientists, and domestic preprint platforms are currently in a developmental stage. From a long-term perspective, building a sustainable, standardized preprint platform service model for domestic academic communication will facilitate academic exchange and provide researchers with an alternative communication model.

1. Definition of Preprints

A preprint refers to a manuscript that researchers voluntarily release on the internet or at academic conferences for peer communication before formal publication in established journals. Operating entirely online, preprints represent a new model of academic resource dissemination. Preprint platforms serve as an important supplement to traditional journal digital publishing platforms, enabling academic achievements to enter the open access domain more rapidly. This approach best embodies authors’ right to publish, accelerates academic communication speed, allows earlier citation of results, and lowers the threshold for publishing academic research, making it widely popular. Chen Yue et al. [?] conducted a bibliometric comparison of citation data for specific disciplinary papers on the arXiv platform, analyzing differences in citation efficiency and volume between non-preprint and preprint manuscripts, thereby highlighting the advantages of preprint platform articles in academic communication and emphasizing how the rapid dissemination of preprint articles’ academic influence can accelerate the open science movement. Consequently, preprint platform papers demonstrate significant advantages in social media forwarding and reading metrics compared to traditional publishing.

1.1 Timeliness: The Most Distinctive Feature Compared to Traditional Publishing

Traditional journal publication cycles are generally lengthy, whereas preprints can bypass review and publication processes to rapidly disseminate research findings. This shortens promotion time, enhances publication efficiency, avoids delays caused by journal publication, and substantially increases knowledge dissemination speed. In unknown corners of the world, many researchers may be working simultaneously on the same topic; uploading preprints allows authors to establish priority for their discoveries. Preprint platform articles can typically be cited, enabling academic exchange and promotion even before formal publication. This approach capitalizes on temporal advantages from the perspectives of articles, authors, and readers alike.

1.2 Breaking the Uniqueness of Academic Submission

Researchers can first publish their unreviewed academic articles directly on preprint platforms for free access and use by the broader research community, while simultaneously submitting these preprint manuscripts to academic journals for formal publication after peer review [?]. Preprint platforms and traditional journals cooperate through “direct transfer” and other models, enabling multi-party sharing among authors, journals, and preprint platforms. This strengthens the connection with scientific research funding programs, and as this complementary and associative effect intensifies, preprint platforms gain increasing influence.

1.3 Transforming Academic Power

In traditional journal structures, editors may hold substantial power, largely determining whether papers are sent for review and ultimately accepted. This can lead researchers to tailor content to editorial preferences. Preprints avoid the conflicts of interest inherent in traditional publishing review processes, weakening editors’ academic authority. Preprint publication occurs solely between authors and platforms, isolating academic publishing from third-party factors.

1.4 Enabling Iterative Development of Academic Achievements

Traditional journal publication requires research to be complete and comprehensive, with fully substantiated conclusions. Except for minor typographical corrections, content cannot be altered after publication. However, preprint platforms allow researchers to continuously update their academic achievements based on research progress, maintaining their currency and completeness [?]. Some preprint platforms enable authors to view more peer reviews, further helping to improve their research. The evolving versions and processes can be displayed, facilitating mutual learning and exchange in research.

2. Analysis of Domestic and International Preprint Platforms

Open access platforms represented by preprint platforms have developed rapidly under the global open science movement. Since physicist Ginsparg created arXiv in 1991, the number of preprint platforms has continuously increased. Following arXiv's basic framework, a batch of high-quality preprint platforms has been established, and domestic preprint platform services are also developing. This section compares and analyzes service quality measures, promotion methods, data sources, and disciplinary coverage of six domestic and international preprint platforms [?], with a detailed analysis of representative platforms shown in Table 1 to better understand operational details and identify gaps.

2.1 arXiv

arXiv is the world's earliest, most renowned, and most successful preprint platform, managed by Cornell University Library and its Member Advisory Board and Scientific Advisory Board. Initially serving only high-energy physics 学术交流, other popular disciplines gradually joined, expanding into a multi-disciplinary platform. Its data sources include traditional preprint literature, a small number of journal papers, and some full-text electronic journals, resulting in mixed and uneven quality academic sources. To ensure service quality, arXiv has implemented several measures. First, it imposes registration requirements, requiring users to have backgrounds from verified research institutions or universities, or recommendation codes from active users, thereby guaranteeing article quality at the source. Second, after submission, manuscripts undergo review and revision by a content review committee. Finally, preprint article versions can be updated at any time to further improve research.

2.2 SSRN

SSRN is the most interdisciplinary preprint platform and was acquired by Elsevier in 2016. Its multi-disciplinary development has earned broad recognition in social science research fields. SSRN continuously innovates its functions, such as academic brand promotion, and has established electronic journal distribution versions for various corresponding themes to disseminate to audiences. In terms of service quality, SSRN sets different review standards according to different journal requirements and incorporates a classification step in the article submission process, with some even providing subscription functions for users to conveniently access the latest academic resources.

2.3 bioRxiv

bioRxiv is the fastest-growing preprint platform in the biomedical field, aiming to expand academic exchange in biology and enable the latest biological research to be applied to human life as quickly as possible. bioRxiv primarily serves the life sciences field, where influential scientists spontaneously organized promotion

efforts, leading to remarkable achievements and rapid development. Notably, bioRxiv has enabled a “direct transfer” function, with “two-way transfer” or “one-click transfer” models enriching article sources for both journals and platforms, achieving multi-party sharing among authors, journals, and preprint platforms.

2.4 China Preprint Service System (NSTL)

The China Preprint Service System (NSTL) is the earliest domestic preprint platform, established in 2004 by the Institute of Scientific and Technical Information of China and the National Science and Technology Library. It enables literature retrieval, full-text browsing, and comment posting functions. Academic resources uploaded by users undergo only rough review before being approved and posted, resulting in inadequate quality control and relatively average operational effectiveness, with low recognition and promotion.

2.5 China Science Paper Online (CSPO)

China Science Paper Online (CSPO) is a relatively mature domestic preprint platform. Unlike NSTL, it has implemented a series of strong and effective quality control measures: author identity requires verification and certification, specific formatting and academic requirements are enforced, and it provides an operational model of “platform editorial review + expert recommendation,” applying evaluation methods of “peer review + registered and certified user evaluation.” The platform not only accepts first-posted papers but also cooperates with domestic scientific journals. However, its promotion channels are limited, making it difficult to popularize in universities and research institutions.

2.6 Chinese Academy of Sciences Preprint Platform (ChinaXiv)

The Chinese Academy of Sciences Preprint Platform (ChinaXiv) is China’s first preprint platform operating according to international norms, aiming to achieve multi-party sharing among research institutions, publishers, and related organizations. ChinaXiv also maintains certain quality requirements for resources: it restricts service objects to CAS internal personnel or certified users from research institutions, provides rapid review services, and has a dedicated platform operation team. Compared with the previous two domestic platforms, ChinaXiv has relatively comprehensive promotion methods, combining online and offline activities internally, cooperating with institutions externally, and simultaneously seeking policy support. These three complementary layers form a comprehensive model. Although the platform is still in the development stage with limited manuscript sources, its prospects are broad.

3. Problem Analysis and Development Paths for Domestic Preprint Platforms

Most preprint platforms are basically built on the arXiv prototype with similar functions. In terms of service quality control, domestic preprint platforms are

making progress, primarily through restricting service objects and strengthening review processes. However, there are fundamental differences in promotion methods. Foreign platforms' high disciplinary recognition and spontaneous promotion by prominent figures surpass traditional promotional methods, significantly increasing user acceptance. In contrast, domestic preprint platforms suffer from low promotion and publicity efforts, resulting in low awareness among universities and research institutions. Additionally, Chinese researchers' acceptance of open access far exceeds their willingness to post preprints, with authors having multiple concerns rooted in insufficient understanding of open access and knowledge sharing concepts.

There are no significant differences between domestic and foreign platforms in terms of development time or functions, but foreign preprint platforms are more open in resource acquisition. Foreign platforms, represented by bioRxiv, have developed earlier and maintain closer cooperation with traditional journals, resulting in richer sources. The "direct transfer" function enables simultaneous automatic submission to both preprint platforms and traditional journal platforms when users submit to either, thereby enriching traditional journals' manuscript sources while gaining acceptance of preprint platforms by some journals and providing authors with additional assurance. Domestic platforms, however, remain in the development stage, mostly allowing upload only after articles are accepted by journals, resulting in insufficiently close cooperation.

3.1 Concept Reshaping and Promotion Through Key Influencers

Starting with academic authors, we must enhance awareness of preprint posting, reshape concepts, and improve sharing willingness. Leveraging national policies and with the promotion of disciplinary spokespersons, we should advance this initiative to all researchers, using key influencers to drive broader promotion. Combining online and offline methods, we should conduct curriculum education and offline presentations targeted at universities and research institutions to fundamentally intervene with service objects and cultivate future researchers' awareness of preprint platform posting.

3.2 Open Cooperation with Academic Resources

Under the premise of concept promotion and publicity on preprint platforms, traditional journals should be encouraged to formulate policies supporting preprint exchange. Preprint platforms can actively publicize and promote concepts, driving traditional journals to establish associations and collaborative development with preprint platforms. Through cooperation, the integration of the two can be rationalized and streamlined, simplifying the academic resource publication process and achieving a win-win situation.

The emergence of preprint platforms has enriched the structure of the publishing ecosystem encompassing journals and books. Their rapid development demonstrates their important role in the academic communication chain. As open

science concepts deepen and preprint platforms continue to improve, they will attract increasing attention, forming a richer knowledge service industry and creating new opportunities. Seizing these opportunities and breaking through bottlenecks to strengthen the construction of world-class scientific and technological journals and promote the high-quality development of Chinese scientific journals is both an inevitable choice for China's transformation from a major science and technology country to a powerful one, and a necessary requirement for enhancing national scientific and technological hard power and cultural soft power to build a world science and technology powerhouse. Domestic preprint platforms should seize this opportunity, actively promote platform development, and participate in future scientific development.

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

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