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# Research on Quality Control in Preprint Development

**Authors:** Liu Jingyu, Zhang Zhixiong, Huang Jinxia, Peng Yuanyuan

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## Abstract

Quality control represents a critical component of preprint services. Currently, internationally adopted preprint quality control methodologies encompass three principal aspects: "verification of research identities of uploaders and authors," "assessment of paper format completeness," and "evaluation of academic quality and authenticity of content" ; with manual review serving as the primary mechanism and machine review as a supplementary measure. The ChinaXiv preprint platform of the Chinese Academy of Sciences has established a quality control framework following international paradigms, comprising systems including routine paper review, domain expert evaluation, open commentary, retraction of problematic papers, and blacklisting of non-credible authors. Future improvements may be directed toward enhancing transparency of the quality control mechanism, fully leveraging the role of open commentary, and strengthening international exchange.

## Full Text

### Research on Quality Control Methods in Preprint Services

**Liu Jingyu, Zhang Zhixiong, Huang Jinxia, Peng Yuanyuan**
National Science Library, Chinese Academy of Sciences, Beijing 100190

## Abstract

Quality control constitutes a critical component of preprint services. Currently, internationally recognized quality control methods for preprints encompass three dimensions: "verification of research identity of uploaders and authors," "review of paper format completeness," and "assessment of academic content and authenticity," with manual review as the primary approach and machine-assisted review as supplementary. The ChinaXiv preprint platform of the Chinese Academy of Sciences has established a quality control mechanism

aligned with international practices, including routine paper review, domain expert review, open commentary, problematic paper retraction, and a non-credible authors list. Future improvements should focus on enhancing transparency of quality control mechanisms, fully leveraging the role of open commentary, and strengthening international exchange.

**Keywords:** preprint; quality control; preprint platform; open access
**Classification Number:** G250

Preprints have emerged as a vital scholarly communication model in the open science environment, offering advantages such as rapid publication cycles and broad dissemination. Since the inception of the first preprint platform arXiv, numerous scientific communities and publishers have launched preprint services, leading to exponential growth in server content—arXiv alone surpassed 1 million papers in 2015. This growth has elevated the prominence and status of preprints in academic communication. However, concerns have arisen regarding the infiltration of "non-academic" or "pseudoscientific" papers into preprint platforms. Some contributors, eager for rapid publication, have falsified research identities or violated academic ethics by posting fraudulent, inaccurate, or plagiarized content. These issues degrade platform quality, damage provider credibility, and more importantly, undermine scientists' trust and adoption of preprints, thereby hindering their development.

According to Google Scholar statistics, four-fifths of the most highly cited physics and mathematics content can be found on arXiv prior to formal publication [1]. Nevertheless, many researchers remain apprehensive about preprint quality. The academic community has traditionally considered citing unpeer-reviewed papers, including preprints, taboo [2], and the presence of immature research findings in preprint systems exacerbates quality inconsistency, further discouraging scholarly use. In 2017, Ghent University Associate Professor Matt Shawkey expressed on social media that preprint content should not be treated equivalently to peer-reviewed papers. Meanwhile, research funding agencies, while generally supportive of preprint development, have voiced quality concerns. In a May 2017 statement, NIH noted that interim research products generally lack the quality of peer-reviewed findings, urging researchers to exercise caution when evaluating preprint resources and requiring platforms to implement rigorous, transparent policies against plagiarism, conflicts of interest, and academic misconduct [3]. That same year, the US ASAPbio foundation proposed that preprints in a Central Service repository must meet basic scholarly standards, including proper authorship, academic ethics rules, legal and social norms, and correct funding attribution [4]. Consequently, robust quality control in preprint services is essential to alleviate researcher concerns and genuinely promote preprint adoption.

Recognizing the importance of quality control, major global preprint platforms have implemented measures to block pseudoscience and prevent misinformation dissemination. This paper synthesizes current international quality control practices for preprint services, analyzes the quality control mechanisms of ChinaXiv

–the Chinese Academy of Sciences' preprint platform–and proposes directions for future improvement.

## 2. International Quality Control Methods for Preprint Services

To comprehensively understand current international quality control practices, this study investigated six renowned preprint platforms–arXiv, bioRxiv, SSRN, ChemRxiv, PeerJ Preprint, and MDPI Preprints–examining their website policies, quality control documentation, and paper submission workflows.

The investigation revealed that mainstream preprint services implement basic quality control to ensure papers meet fundamental academic requirements: authors must possess legitimate research identities and avoid fabrication or plagiarism; content must be authentic with clear research processes; and attribution must be properly documented [5]. These measures prevent pseudoscientific, fraudulent, or discipline-inappropriate papers from publication. Quality control primarily comprises three aspects: verification of research identity of uploaders and authors, review of format completeness, and assessment of academic content and authenticity. Operationally, most platforms rely on manual review supplemented by machine assistance. Manual review, typically conducted by domain experts, focuses on academic content and authenticity, while machine review supports identity verification and format checking. For instance, arXiv monitors all submissions, using arXiv moderators for initial screening and 采取措施阻止试图强行绕过上诉过程而再次提交已经被拒稿的论文作者 (implementing measures to prevent authors of rejected papers from circumventing the appeals process through resubmission). Further review is performed by volunteer domain experts recommended by platform board disciplinary committees. Additionally, most surveyed platforms support open commentary on published content, helping identify academic merit, purify platform content, and facilitate author improvements.

The quality control measures are detailed below:

**(1) Verification of Research Identity of Uploaders and Authors**
Identity verification represents the first step in preprint quality control, examining registration email, institutional homepage information, funding status, and peer recognition within the field. Among the six platforms, three require user registration and submission qualification review, including arXiv and MDPI Preprints. As the world' s largest preprint platform, arXiv rigorously verifies submitter credibility, requiring institutional email registration, active research identity declaration with supporting evidence, and recommending ORCID integration [6]. The system verifies author contact information and email addresses; fabricated institutions result in immediate and permanent submission bans. After registration, uploaders must obtain endorsement from a recognized researcher in their field–typically someone with substantial arXiv publication history–before they can submit papers.

**(2) Review of Format Completeness**
Format completeness verification examines whether papers contain all essential elements and comply with platform requirements. Except for SSRN and ChemRxiv (where format review information was unavailable), all surveyed platforms implement format quality control. For example, arXiv requires papers to meet general academic standards with complete basic elements, rejecting abstracts-only submissions, papers without citations, books, commentaries, or reports lacking original independent research. bioRxiv mandates that submitted articles contain essential paper elements in PDF or standard text format.

**(3) Assessment of Academic Content and Authenticity**
Content assessment focuses on academic merit, legality, and authenticity without evaluating research quality itself. Control points include: academic integrity, non-plagiarism, absence of offensive content, legal compliance, no malicious attacks, defamation, classified information, or other illegal content, and freedom from copyright disputes.

Using arXiv as an example, its policies explicitly require "exclusively scientific research content"associated with 18 disciplines. arXiv rejects papers featuring: (1) inflammatory or false content; (2) inappropriate subjects or misrepresentation; (3) overly dramatic titles, abstracts, or introductions; (4) repetitive submissions in short timeframes; and (5) works with copyright disputes—authors must hold complete copyright for arXiv content. Similar requirements exist for bioRxiv, SSRN, and ChemRxiv.

Quality Control Content of Major Domestic and International Preprint Platforms

| Platform | Research Identity Verification | Format Completeness Review | Content Academic & Authenticity Review |
|---|---|---|---|
| arXiv [7] | Institutional email suffix, affiliation, endorsement from field researchers | Meets general academic requirements, complete basic elements | Academic and disciplinary relevance; domain expert participation in review |
| bioRxiv [8] | Not specified | Contains essential elements; must be PDF or standard text format | Non-plagiarism; no offensive or unscientific content; unpublished work |
| SSRN [9] | Not specified | Not specified | Content meets academic standards; uses academic terminology |

| Platform | Research Identity Verification | Format Completeness Review | Content Academic & Authenticity Review |
|---|---|---|---|
| PeerJ Preprint [10] | Not specified | Paper type, word count limits; required elements vary by research direction | Must not be published on other preprint platforms |
| ChemRxiv [11] | Not specified | Not specified | Non-plagiarism; no offensive or unscientific content; chemistry PhD participation in review |
| MDPI Preprints [12] | Account registration required; author verification before submission | No editorials or coursework; basic paper elements required | All papers undergo internal MDPI review |

In practice, as preprint platforms proliferate globally and paper volumes increase, these quality control measures provide effective safeguards for healthy, orderly preprint service development and represent current international best practices.

## 3. ChinaXiv Quality Control Mechanism

The Chinese Academy of Sciences' Science Paper Preprint Platform ChinaXiv (http://chinaxiv.org), launched in 2016, provides Chinese and English preprint services for natural science researchers nationwide. To ensure academic rigor, scientific integrity, and authority, ChinaXiv has established quality control mechanisms aligned with international practices, including routine paper review, domain expert review, open commentary, problematic paper retraction, and a non-credible authors list.

**(1) Routine Paper Review System**
ChinaXiv maintains a quality control review team responsible for daily preprint review and publication, implementing a two-tier system of initial and final review to maximize fairness and impartiality. The platform has developed the "ChinaXiv Paper Review Guidelines" and "ChinaXiv Paper Admission Standards" to ensure orderly, efficient review processes. The guidelines standardize review workflows and operations, while the admission standards assist reviewers in determining publishable papers.

Routine review encompasses three dimensions:

**Verification of research identity of submitters and authors.**
Admission standards explicitly require legitimate research identities for upload-

ers and authors. ChinaXiv recommends institutional email registration with email and mobile verification [13]. Authors may optionally submit ORCID, institutional homepage, academic profile, education background, research experience, and previously published peer-reviewed papers. Papers cannot be published on ChinaXiv if submitters or authors have falsified affiliations or identities, or have not published peer-reviewed papers on the same topic.

**Review of format completeness, content duplication, plagiarism, and copyright issues.**
The ChinaXiv system automatically checks for completeness of titles, abstracts, keywords, references, and other essential elements, as well as duplication with existing platform papers and plagiarism 嫌疑. Machine judgment results assist manual review. Authors must guarantee no copyright disputes for uploaded papers.

**Assessment of research merit and scientific validity.**
ChinaXiv explicitly states that submitted scientific papers should demonstrate scientific rigor, innovation, and academic value, firmly resisting academic misconduct including plagiarism, fabrication, and fraud, and excluding malicious attacks, defamation, classified information, or illegal content. Admission standards clearly prohibit publication of papers with inappropriate discourse or pseudoscientific content.

Through these three review dimensions, ChinaXiv ensures effective daily operations and content quality.

**(2) Domain Expert Review System**
Beyond the quality management team, ChinaXiv mobilizes researchers—including Science Advisory Committee members and Chinese Academy of Sciences researchers with associate senior-level positions or higher—to participate in quality control. When routine review cannot determine research merit or scientific validity, the expert review process is activated, with domain experts providing review opinions for ChinaXiv' s final publication decision.

**(3) Open Commentary System**
Following the "publish first, review later" principle, all preprints undergo commentary from registered platform users after publication. The platform provides star ratings and commenting functions (public, anonymous, or author-only). Commentary undergoes team review before publication. Papers receiving substantial negative feedback enter re-review and potential retraction processes.

**(4) Problematic Paper Retraction System**
While safeguarding authors' publication and access rights, ChinaXiv requires adherence to basic academic ethics. Papers found with plagiarism 嫌疑, author identity fraud, or scientifically invalid content are submitted to platform leadership for review, with potential retraction and public announcement.

**(5) Non-Credible Authors List System**
To eliminate non-scientific or pseudoscientific papers, ChinaXiv maintains a non-

credible authors list based on identified academic misconduct, including authors of retracted papers, validated by platform leadership. Papers from listed authors bypass standard review and publication processes.

Through these mechanisms, ChinaXiv has developed a quality control model led by the platform with multi-party participation from authors, users, and experts, achieving full-process quality control from submission through review to publication. Since its June 2016 launch, ChinaXiv has provided stable preprint services to researchers, receiving and publishing nearly···

## 4. Improvements to ChinaXiv Quality Control Mechanism

[Figure 1: see original paper] Schematic Diagram of ChinaXiv Preprint Quality Control Mechanism

Current trends in international preprint development present dual imperatives: on one hand, discipline-specific preprint platforms continue to emerge with rising paper volumes, making preprints increasingly important in scholarly communication; on the other hand, demands for standardized platform operations have intensified. NIH' s May 2017 statement explicitly recommended that preprint platforms establish transparent review mechanisms with appropriate quality control to meet researchers' needs for high-quality academic content. Simultaneously, international funding organizations have called for integrating dispersed preprint resources into a Central Service providing core services through comprehensive policy, technical, metadata, and content planning. Against this backdrop, ChinaXiv' s quality control mechanism can be enhanced in the following areas to better provide sustained, stable, high-quality preprint services.

First, ensure transparency of quality control mechanisms. Throughout international preprint development, platform operators have faced author allegations of bias. For example, a University of Geneva quantum physicist suspected arXiv of "blacklisting" after his students' paper on black holes was rejected, arguing that while not rigorous, it was appropriate as a preprint [14]. Similar accusations have arisen regarding arXiv relegating certain papers to low-activity categories, hindering scholarly exchange. While the validity of such allegations remains debatable, the underlying concerns warrant attention. ChinaXiv should prioritize making all platform policies publicly accessible and easily discoverable, strengthen reviewer training to ensure standardized operations, and maintain comprehensive process documentation and archiving.

Second, fully leverage the open commentary mechanism' s role in quality control. "Publish first, review later" represents a distinctive advantage of preprints as a novel scholarly communication mode, yet this benefit remains underrealized in ChinaXiv' s current development. The open commentary mechanism can play a more significant role in future quality control enhancements. ChinaXiv should integrate user ratings and comments with routine review and expert evaluation processes. Additionally, referencing social media commentary policies such as

Q&A platform Quora, ChinaXiv should standardize open commentary behavior, strengthen commentary content analysis, and improve review efficiency.

Finally, ChinaXiv should closely monitor international preprint platform developments, strengthen exchanges and discussions with other preprint services on quality control policies and methods, further refine review standards, promote streamlined review processes, enhance review efficiency and accuracy, prevent pseudoscientific paper infiltration, and ensure sustainable, healthy platform development.

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

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