Investigation and Implications of Volunteer-Based Academic Quality Control Methods in International Preprint Platforms: A Case Study of arXiv and RePEc

Authors: Yonghui Song, Ma Tingcan, Liu Jingyu, Liu Jingyu

Date: 2023-03-10T00:00:00+00:00

Abstract

Objective This study investigates the roles and functions of volunteers in academic quality control of preprint platforms to provide insights for developing preprint platforms in China. Methods Through web survey and case study methods, we examined and summarized the current development status of volunteer mechanisms in over ten internationally renowned preprint platforms. Based on these findings, the most representative platforms—arXiv and RePEc—were selected as case studies for an in-depth analysis of how the fundamental architecture and organizational functions of volunteer mechanisms influence academic quality control in preprint platforms. Results International preprint platforms demonstrate significant variation in volunteer mechanism maturity. Both arXiv and RePEc feature a volunteer work mechanism architecture with clearly defined rights and responsibilities, and diverse academic quality control functions with deep volunteer involvement, though the types of roles performed by volunteers differ between the two platforms. Conclusion Volunteers constitute an essential component of preprint platform quality control systems. Preprint platforms in China should widely recruit volunteers, gradually establish and improve volunteer mechanisms, optimize volunteer mechanism architecture and clarify volunteer work functions, and draw on international experience to enrich academic quality control functions through volunteer participation.

Full Text

Investigation and Enlightenment on Academic Quality Control Methods of International Preprint Platforms with Volunteer Participation: A Case Study of arXiv and RePEc Platforms

SONG Yonghui[1,2], MA Tingcan[1,2,4], LIU Jingyu[2,3]
[1]) Wuhan Library, Chinese Academy of Sciences, Wuhan 430071, China
[2]) Department of Information Resources Management, School of Economics and Management, University of Chinese Academy of Sciences, Beijing 100190, China
[3]) National Science Library, Chinese Academy of Sciences, Beijing 100190, China
[4]) Hubei Key Laboratory of Big Data in Science and Technology, Wuhan 430071, China

Abstract

[**Purpose**] To explore the role and function of volunteers in the academic quality control of preprint platforms, and to provide a reference for the construction of preprint platforms in China. [**Methods**] Using web-based survey and case study methods, we investigated and summarized the current development status of volunteer mechanisms across more than ten internationally renowned preprint platforms. Based on these findings, we selected the most representative platforms—arXiv and RePEc—as case studies to analyze in depth how the infrastructure and organizational functions of volunteer mechanisms influence academic quality control on preprint platforms. [**Findings**] The maturity of volunteer mechanisms varies significantly across international preprint platforms. Both arXiv and RePEc have established volunteer work frameworks with clearly defined rights and responsibilities, and volunteers are deeply involved in diverse academic quality control functions, though the types of roles played by volunteers differ between the two platforms. [**Conclusions**] Volunteers constitute an important component of the quality control system on preprint platforms. Chinese preprint platforms should broadly recruit volunteers and gradually establish and improve volunteer mechanisms; optimize the structure of these mechanisms to clarify volunteer functions; and draw on international experience to enrich academic quality control functions with volunteer participation.

Keywords: Preprints; Quality Control; Volunteer Mechanism; arXiv; RePEc

Author Contributions: SONG Yonghui: Conceptualized the research, drafted the initial manuscript, revised the final version; MA Tingcan: Reviewed the manuscript, revised the final version; LIU Jingyu: Reviewed the manuscript, participated in revisions, revised the final version (Corresponding Author).

Introduction

Timely dissemination of scientific findings is essential for the dynamic advancement of science[1]. In March 2021, China' s national "14th Five-Year Plan and 2035 Long-Range Objectives Outline" designated the "construction of a high-end exchange platform for national research papers and scientific and technological information" as a priority for future government work[2]. As a pioneer of the open access movement[3], preprint platforms offer numerous advantages including short publication cycles, wide dissemination[4], diversified utilization, and timely exchange and sharing[5]. Their rapid publication and distribution model can timestamp new scientific research or technological innovation outcomes, avoiding delays caused by traditional journal review processes[6], making them an indispensable component of the open science ecosystem. Widespread adoption of preprints facilitates immediate exchange of research findings and promotes broader dissemination, collaboration, and communication of domain-specific scientific knowledge, while also avoiding issues associated with traditional double-blind peer review such as lack of transparency, reliability, and objectivity; potential bias; possible unethical behavior; and inconsistent reviewer opinions[7-11]. According to surveys, nearly 70% of Chinese researchers hold a positive attitude toward submitting to preprint platforms[12].

However, because preprint platforms lack the rigorous review systems and comprehensive peer review mechanisms of traditional journals, published research has not undergone standard scientific publication quality control processes[13], leading to problems such as forged or misappropriated identity information[4], insufficient evidence-based data in research findings[14], and the release of unscientific experimental results that trigger public misconceptions[15]. Some scholars question the quality of preprint research[16], and unreviewed preprint content may damage public trust in science[17]. Non-scientists such as practitioners, journalists, and policymakers still need to adjust their credibility perceptions when encountering non-peer-reviewed preprints[18], and concerns about preprint quality persist within the academic community. Scientists must engage more responsibly with journalists and the public[19]. Academic quality control issues have consistently hindered the development of preprint platforms and significantly affected their overall reputation and researchers' willingness to submit manuscripts[20]. Exploring and constructing scientific, rational, and effective academic quality control mechanisms has become a critical issue for the future development of preprint platforms.

A review of relevant research reveals that existing studies on preprint platform quality control focus primarily on three aspects: First, research on preprint platform peer review mechanisms. As a key component of traditional academic journal publishing[21], peer review bears important responsibility for controlling and improving paper quality[22]. Scholars have explored various peer review mechanisms suitable for preprint platforms, including reader rating systems[23], online post-publication review[24], third-party open review[25], a token economy-based self-organizing peer review quality assurance framework[26], preprint peer re-

view performance evaluation indicators[27], online paper scoring models and virtual point incentive mechanisms[28], and a token incentive mechanism-based self-organizing peer review framework for preprints[29].

Second, research on preprint platform quality control methods. For instance, Liu et al.[4] investigated quality control methods at major international preprint platforms including arXiv, bioRxiv, SSRN, ChemRxiv, PeerJ Preprint, and MDPI Preprints. Luo et al.[30] examined copyright policies at well-known preprint platforms such as arXiv, bioRxiv, and ChemRxiv. Zhou[31] surveyed ten major preprint systems domestically and internationally, finding that quality control methods mainly include document classification, document deletion, and authors' right to appeal and related processing.

Third, research on the role of volunteers in preprint platform quality control. German scholar Krewinkel[1] defined preprint platform volunteers as primary and active participants in the creation and evaluation of scientific manuscripts. Wang[32] found in doctoral research that volunteers play numerous roles in preprint platform operation and maintenance, including registration, review, publication, announcement, dissemination, information retrieval, and metadata provision. Zhang et al.[33] discovered through preprint platform investigations that content review on most platforms is conducted by volunteers.

In summary, scholars both domestically and internationally have affirmed the promotional effect of preprint platform quality control on platform development and enriched the theoretical system of preprint platform quality control research using diverse samples and methods. However, room for further improvement remains: existing research has largely explored preprint platform quality control mechanisms based on peer review systems and external platform characteristics, while internal features such as operating entities and operational mechanisms have received insufficient attention. Academic volunteers represent one of the main drivers in the historical development of scientific research[34]. The Directory of Open Access Journals (DOAJ), an internationally renowned academic journal database and open access journal promotion organization created by Lund University in Sweden, collaborated with volunteers to delist massive numbers of predatory and low-quality open access journals, thereby establishing a blacklist system[35]. The common practice of international journals in traditional peer review also implicitly treats peer review as voluntary academic work[36], with most journal reviewers serving in a volunteer capacity[37]. Similar to Wikipedia, which is driven entirely by volunteer contributions[38], most preprint platforms are also promoted and formed by volunteer groups dedicated to open academic exchange. Platforms such as Arabixiv for collecting Arabic papers, INA-Rxiv serving Indonesian scientists, AfricaRxiv aiming to increase African scientific visibility, and IndiaRxiv focusing on Indian indigenous research are all preprint platforms spontaneously created and maintained by volunteers worldwide[17]. As the main force in the initial construction and later maintenance of preprint platforms, volunteers play an extremely important role in new academic exchange models and constitute an important component of

the preprint platform academic quality control process. Yet no scholars have revealed the impact of volunteers on preprint platform quality control. Based on this, this study examines preprint platform internal operational mechanisms, focusing on volunteer mechanisms at international mainstream preprint platforms to explore the roles and functions of volunteers in promoting academic quality control on these platforms. This research aims to provide a new perspective for preprint platform quality control research and valuable references for the construction of Chinese preprint platforms.

2 Research Methods and Objects

This study primarily employs web-based survey and case study methods. First, drawing on research by Zhang et al.[39], Liu[4], Xie[40], Zhu[41], Tang[42], and Yang[43] regarding internal and external characteristics of international mainstream preprint platforms, we comprehensively considered platform scale, influence, disciplinary scope, and operational models to select over ten internationally authoritative preprint platforms as research objects: arXiv, bioRxiv, ChemRxiv, medRxiv, RePEc, F1000, SSRN, agriRxiv, EarthArXiv, PLOS, EGUsphere, AfricArxiv, and MindRxiv. We respectively investigated and collected relevant information about volunteer work on their official websites and conducted preliminary collation and analysis. Second, based on these initial findings, we selected arXiv (multi-disciplinary, institution-operated) and RePEc (single-discipline, volunteer-operated), the platforms with the most well-developed and representative volunteer mechanisms, as case studies for further analysis. Using an explanatory multiple-case study approach[44], we conducted in-depth investigations of objective information from both platforms to clarify the current development status of preprint platform volunteer mechanisms, reveal from two dimensions—infrastructure and organizational function—how volunteer mechanisms influence academic quality control on preprint platforms, and conduct comparative analysis of typical preprint platforms. The data collection period was April to August 2022.

3 Findings

3.1 Most Preprint Platforms Have Volunteer Mechanisms, but with Varying Degrees of Maturity

The preliminary investigation of selected research objects' volunteer mechanisms is shown in Table 1 , where checkmarks represent confirmation and crosses represent negation; platforms without volunteer-related information mentioned are not displayed due to space limitations. Statistics reveal that most preprint platforms choose to publicly recruit volunteers and have basic volunteer work mechanisms, though the degree of maturity varies significantly across platforms. Platforms that publicly recruit volunteers include arXiv, bioRxiv, ChemRxiv, medRxiv, RePEc, F1000, SSRN, PLOS, and EGUsphere. Platforms with clearly defined volunteer functions include arXiv, bioRxiv, medRxiv, RePEc, and EGU-

sphere. Platforms that have established dedicated volunteer sections are arXiv and RePEc. Therefore, subsequent analysis in this paper focuses on the volunteer mechanisms of arXiv and RePEc.

arXiv is an open-access preprint platform for scholarly papers accessible to all of society[45], founded by American quantum physicist Paul Ginsparg in 1991 and transferred to Cornell University Library for maintenance and operation in 2001[46-47]. Initially open only to physics papers, arXiv has evolved into an international mainstream preprint platform covering multiple scientific fields including physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics.

RePEc (Research Papers in Economics) originated from NEP (New Economics Papers), an online distribution system for academic exchange[48]. By 1997, over 100 volunteers from 51 countries worldwide had voluntarily established the cooperative database system RePEc on this foundation. As a classic traditional preprint platform created in the same era as arXiv and SSRN, RePEc has, after more than two decades of exploration and development, been recognized by numerous traditional academic institutions and funding organizations[17], becoming an international mainstream preprint platform in economics. It has cumulatively received approximately 3.8 million research items contributed by over 2,200 archives from 103 countries, drawn from 3,750 journals and 5,400 working paper series, with more than 64,000 registered authors and weekly email subscription services reaching 80,000 recipients.

3.2 Both arXiv and RePEc Have Established Volunteer Mechanism Frameworks with Clear Rights and Responsibilities

3.2.1 arXiv Volunteer Rights and Responsibilities Mechanism To enhance platform content review capabilities, improve integration processes for author submissions, and stabilize back-end technical support functions, arXiv has established volunteer positions including disciplinary section review moderators, disciplinary section review members, and volunteer developers. Specific personnel arrangements, functions, requirements, and characteristics for each position are shown in Table 2 .

3.2.2 RePEc Volunteer Rights and Responsibilities Mechanism Volunteers are the core constituent element of RePEc. To enhance platform academic quality control capabilities, RePEc has established a comprehensive volunteer mechanism dividing volunteer positions into six types: archive maintainers, high-quality paper push editors, Munich Personal RePEc Archive (MPRA) editors, Economics Departments, Institutes and Research Centers in the World (EDIRC) help advisors, author service advisors, and plagiarism committee members. Specific personnel arrangements, functions, requirements, and characteristics for each position are shown in Table 3 .

3.3 Volunteers at arXiv and RePEc Undertake Multiple Academic Quality Control Functions

3.3.1 arXiv Volunteer Organization and Functions (1) Disciplinary Section Volunteer Moderators and Members

arXiv has established disciplinary section volunteer moderators and members (hereinafter referred to as volunteer moderators) in its content review system, inviting scientists from around the world with terminal degrees in their respective fields to voluntarily serve as disciplinary moderators (or volunteer subject experts). arXiv disciplinary section volunteer moderators are approved by their disciplinary advisory committees and arXiv staff, currently covering eight scientific fields: computer science, economics, electrical engineering and systems science, mathematics, physics, quantitative biology, quantitative finance, and statistics.

Volunteer moderators conduct non-peer-review content review of user submissions, evaluating submitted preprints from aspects including academic value, content relevance, content duplication, paper format, paper subject classification, copyright licensing, and submission frequency[49], and provide recommendations for "reclassification" or "deletion" actions[33]. The platform publishes submissions to the most relevant categories on arXiv based on volunteer moderators' evaluation results. When submissions do not meet arXiv policies, lack originality, novelty, or significance, fail to meet formatting requirements (such as abstract-only submissions, presentations, book announcements, book reviews, submissions without references, calls for papers, articles containing advertisements, or links to other repositories), or fall outside arXiv' s current scope or constitute duplicate submissions, moderators may deem them inappropriate during classification and the user' s submission may be deleted.

(2) Volunteer Developers

arXiv' s platform technical infrastructure and software are primarily operated and maintained by a core team of Cornell University IT staff. Volunteer developers are specifically responsible for version control, website testing, unit testing, type annotation, static checking, and other tasks related to arXiv' s open-source software. Actual work content includes but is not limited to: plain text APIs for research, OAI-PMH endpoints, arXiv canonical records in AWS, author name disambiguation, normalizing electronic funder information, linking code, datasets, and publications, and designing new submission APIs.

3.3.2 RePEc Volunteer Organization and Functions (1) Archive Maintainers

Archive maintenance is the most common volunteer work at RePEc, with primary responsibility for helping specific departments or institutions establish dedicated RePEc archives. Based on work functions, this is further divided into archive storage volunteers and archive operation volunteers. First, archive stor-

age volunteers must use any text editing program to describe each publication from institutions creating web bibliographic databases in plain text (ASCII) files using simple formats, then provide RePEc with publication-related information with the help of metadata. Metadata files reside on the volunteers' servers, which RePEc staff regularly access to check for additions, changes, and deletions before integrating them into corresponding sections for knowledge dissemination and exchange. Second, archive operation volunteers' main task is to properly maintain their institution' s RePEc archives. Volunteers must ensure their institution' s publications are included in RePEc and then disseminated through various channels detailed on their institutional homepages. Additionally, archive operation volunteers are responsible for maintaining publication data on their institution' s servers.

(2) High-Quality Paper Push Editors

High-quality paper push editors are primarily responsible for operating and maintaining RePEc' s NEP (New Economics Papers) reports. Volunteer editors must provide weekly updates on the latest online research findings in over 90 sub-disciplinary economics research fields to platform subscribers, including knowledge management and knowledge economics, accounting and auditing, economics of aging, agricultural economics, banking, business economics, cognitive and behavioral economics, human capital and human resource management, and economics of human migration. RePEc high-quality paper push editors manage all newly submitted papers received by the platform, screening and determining which high-quality online papers ultimately appear in the current high-quality economics paper push reports.

(3) Munich Personal RePEc Archive (MPRA) Editors

RePEc created MPRA (Munich Personal RePEc Archive) primarily to ensure authors obtain copyright for their preprint research findings in case the copyright for the final article belongs to publishers. RePEc aims to establish a countervailing mechanism to control traditional journal publication fees. In practice, MPRA editors are mainly responsible for reviewing whether files uploaded by authors to RePEc are legitimate, typically checking only formal aspects to ensure submissions have academic nature. Each English editor processes over 50 submissions daily on average. Additionally, MPRA has established volunteer metadata quality analyst positions to check data quality of user submissions and make modifications when necessary.

(4) Economics Departments, Institutes and Research Centers in the World (EDIRC) Help Advisors

EDIRC (Economics Departments, Institutes and Research Centers in the World) is RePEc's global index of renowned economics institutions, providing users with links to economic departments, research institutes, think tanks, and related government agencies and societies, while also being used for affiliation and ranking in RePEc Author Service. EDIRC lists economics institutions employed in public and academic sectors since 1995: economic departments, research cen-

ters, business schools, policy institutions, and think tanks, comprising over 800 economics societies and more than 15,000 institutions from 232 countries and regions. The index is organized by country and field, including economic department research centers and university institutes, as well as finance ministries, statistical bureaus, central banks, think tanks, and other non-profit institutions where leading economists work. Given the substantial growth of the EDIRC database, help advisors are needed for daily maintenance such as fixing broken links or adding new ones.

(5) Author Service Advisors

RePEc author service advisors help authors create online profiles linking to their works in the RePEc system, establishing personal research archives displaying all identified research outputs. This helps reveal authors' citation patterns at the macro level, assists authors in regularly obtaining statistics on downloads and new citations, and provides help in monitoring service activities and managing deceased authors' profiles. Additionally, author service advisors are responsible for connecting economists with their research outputs in RePEc, such as placing author biographies in all their works and, with authors' permission, enabling subscribers to track their contact information even after they relocate.

(6) Plagiarism Committee

The RePEc Plagiarism Committee defines all forms of plagiarism as unethical publishing behavior, committed to finding researchers with good scientific integrity records to reduce plagiarism in platform content. RePEc explicitly requires authors to ensure submitted papers are original works before submission, and that if they use others' research content, corresponding text should be properly cited. If users discover suspected plagiarized works among published research on the RePEc platform, academic misconduct reports must provide the plagiarism committee with detailed reasons and evidence for the plagiarism determination and report to the anti-plagiarism committee under real names; the committee does not accept anonymous allegations. However, reporters may request that corresponding committee members not disclose their identity, including to other committee members. The committee is then responsible for accepting plagiarism cases, reviewing them based on relevant work links and PDF files provided by reporters (for example, for closed publications, available only to the committee), and ensuring contact with violating authors within two weeks for corresponding penalties. Committee members must also submit cases to the plagiarism committee collective meeting, where all committee members vote on sanctions against accused plagiarizing authors. If more than two-thirds of members agree, the sanction is approved. Authors sanctioned for academic misconduct face six penalties: 1) notification to the plagiarizing author' s superior; 2) full-platform editorial review and boycott of their research outputs; 3) retraction of published works; 4) immediate prohibition from RePEc Author Service; 5) platform administrators placing the accused plagiarist on a watchlist blacklist; 6) publicizing the academic misconduct case of the plagiarized defendant on the RePEc plagiarism website.

3.4 Comparative Analysis of Volunteer Mechanisms on arXiv and RePEc Platforms

Volunteers are primary participants in preprint platform construction, undertaking numerous important tasks including content review, technical development, and system maintenance. However, our investigation reveals that most preprint platforms have not yet established well-developed volunteer work mechanisms, specifically manifested in non-public volunteer recruitment methods, unspecified position arrangements, unclear work functions, and inadequate volunteer reward and punishment mechanisms. These factors weaken the academic quality control functions of preprint platforms to some extent.

Focusing on arXiv and RePEc, both platforms have established relatively comprehensive volunteer work mechanisms, with volunteers becoming important components of their quality control systems. However, differences exist between their current volunteer mechanisms regarding role positioning and organizational functions: as a multi-disciplinary preprint platform operated and maintained by an institution, arXiv is primarily led and managed by Cornell University, guided by the arXiv Scientific Advisory Board and arXiv Member Advisory Board, with daily maintenance and operation mainly conducted by arXiv staff, where volunteers play a more auxiliary role in helping staff complete content review and technical development tasks. In contrast, RePEc is a preprint platform entirely driven and managed by volunteers, with nearly all work—including platform maintenance, content review, institutional database maintenance, high-quality paper push, author services, and academic misconduct review—completed by volunteers who play a core leadership and management role.

4 Discussion and Recommendations

Preprints play a crucial role in the scientific development trend from open access to open science, profoundly transforming traditional academic publishing models and being entrusted with the mission of enabling open peer review for researchers[50]. However, the lack of scientific academic quality control methods for preprints results in low recognition and questionable quality of preprint outputs within the academic evaluation system. Based on internal operational characteristics of preprint platforms, this study investigated and analyzed volunteer mechanisms at international mainstream preprint platforms arXiv and RePEc, finding that volunteers constitute an important component of academic quality control systems on preprint platforms. Well-developed volunteer mechanisms help preprint platforms enhance academic quality control capabilities, strengthen their open science and citizen science attributes, and promote the dissemination and exchange of trustworthy scientific knowledge on a larger and broader scale. Based on these findings, we propose three recommendations for constructing academic quality control systems for Chinese preprint platforms.

(1) Broadly Recruit Volunteers and Gradually Establish and Improve

Volunteer Mechanisms

To enhance their own academic quality control capabilities, Chinese preprint platforms should expand volunteer recruitment methods, actively advocate for and encourage scholars from the field to join the preprint platform volunteer community, and collectively contribute to building Chinese preprint platforms. For example, platforms could recruit volunteers with professional technical backgrounds in computer science to participate in back-end technical updates and maintenance, assisting platform staff with version control, website testing, unit testing, type annotation, static checking, dataset and publication linking, and API design. Platforms could also recruit researchers with relevant disciplinary backgrounds to participate in preprint content review, conducting preliminary examination and evaluation of author-submitted preprints from aspects including paper format, academic value, content relevance, and research integrity, thereby improving the quality of preprint outputs published on the platform.

(2) Optimize Volunteer Mechanism Structure and Clarify Volunteer Work Functions

A scientifically rational volunteer mechanism structure is the prerequisite and foundation for volunteers to work efficiently. First, while broadly and publicly recruiting volunteers, Chinese preprint platforms should further optimize platform volunteer mechanism structures. Drawing on practical experience from international mainstream preprint platform volunteer mechanisms, platforms should clarify personnel arrangements, recruitment requirements, work functions, and reward-punishment mechanisms for different volunteer positions, standardizing volunteer workflows to maximize volunteers' contributions to improving preprint platform academic quality control capabilities. Second, Chinese government and science and technology management decision-makers should formulate relevant incentive policies, providing preprint platforms with more research funding and academic resources to support volunteer recruitment and management, and supporting preprint platform operating institutions in implementing volunteer mechanisms and calling on researchers from various fields to actively participate in building Chinese preprint platforms. Additionally, Chinese preprint platforms should fully implement volunteer work reward and punishment measures, and promote the integration of volunteer evaluation results with the national science and technology evaluation system, such as giving priority to platform volunteers who have contributed to Chinese preprint platform construction in professional title promotion and research fund applications, encouraging volunteers to better participate in and assist with academic quality control work on Chinese preprint platforms.

(3) Draw on International Experience to Enrich Academic Quality Control Functions with Volunteer Participation

First, Chinese preprint platforms should "adapt measures to local conditions"and determine the types of roles platform volunteers should play based on their own operational and management models. Second, they should draw on the practical

experience of volunteer deep participation in preprint platform quality control functions at arXiv and RePEc platforms, improving platform academic quality control capabilities from aspects including content review, technical development, dataset maintenance, API design, author services, regular high-quality paper pushes, and personal and institutional archive maintenance, as well as academic misconduct review. For example, platforms could establish volunteer content reviewers, inviting experts and young scholars from various disciplines to review author information and qualifications, submission formats, and academic value. They could establish high-quality output recommendation groups responsible for screening submissions and regularly pushing quality papers to platform users via email. They could recruit volunteer author service advisors to serve as bridges between platforms and users, representing platforms in connecting with authors and publishers, and helping users resolve issues encountered when using preprint platforms. They could establish online institutional and personal output databases to enable platform users to access all research outputs of target institutions or scholars anytime and anywhere, while recruiting volunteer editors to maintain and update these databases, regularly checking for additions, changes, and deletions to institutional and author outputs.

This study systematically reviewed the current development status of volunteer mechanisms at over ten international mainstream preprint platforms, finding that most have not yet established well-developed volunteer mechanisms. It then focused on arXiv and RePEc platforms, deeply analyzing the infrastructure and operational models of their volunteer mechanisms and their impact on preprint platform academic quality control, conducted comparative analysis of the two platforms' volunteer mechanisms, and proposed four recommendations for constructing and developing Chinese preprint platforms. However, this research has certain limitations: it only summarized the impact of volunteers on preprint platform academic quality control, while preprint platform academic quality control is a complex process. Future research needs to conduct correlational analysis between volunteers and other influencing factors in preprint platform academic quality control to further explore pathways for improving preprint platform academic quality control effectiveness.

References

[1]Krewinkel A, Winkler R. Formatting open science: agilely creating multiple document formats for academic manuscripts with pandoc scholar [J]. PEERJ Computer Science,2018: e112.
[2] Chinese Government Network. The 14th Five-Year Plan for National Economic and Social Development of the People' s Republic of China and Long-Range Objectives for 2035 [EB/OL].[2022-07-24]. http://www.gov.cn/xinwen/2021-03/13/content_{5592681}.htm.
[3]Xie H, Liu X, Jing R. An empirical study on the influence of preprint platform bioRxiv and suggestions[J]. Chinese Journal of Scientific and Technical Periodicals,2019,30 (11):

[4]Liu J, Zhang Z, Huang J, et al. Research on quality control methods in preprint services[J]. Digital Library Forum,2017 (10): 15-19.
[5]Zeng J. Emphasizing the ecological construction of preprints and their systems[J]. Digital Library Forum,2020 (10): 1-2.
[6]Zeng J, Zheng A. Opportunities and challenges for open access of Chinese scientific journals[J]. Acta Editologica,2021,33 (4): 359-364.
[7]Rothwell PM, Martyn CN. Reproducibility of peer review in clinical neuroscience - is agreement between reviewers any greater than would be expected by chance alone? [J]. Brain,2000 (123): 1964-1969.
[8]Das A K. 'Peer Review' for scientific manuscripts: emerging issues, potential threats, and possible remedies [J]. Armed Forces Medical Journal India,2016,72 (2): 172-174.
[9]Helmer M, Schottdorf M, Neef A, et al. Research: gender bias in scholarly peer review [J]. eLife,2017,6: e21718.
[10] Lee CJ, Sugimoto CR, Zhang G, et al. Bias in peer review [J]. Journal of the American Society for Information Science and Technology,2013,64 (1): 2-17.
[11]Dakota M, Kyle S, Vincent L, et al. Gender and international diversity improves equity in peer review. bioRxiv. [Preprint]2018:400515. https://doi.org/10.1101/400515.
[12]Chu J, Liu P, Weng Y, et al. Investigation and analysis of the awareness and recognition of open access journals by different roles[J]. Journal of Library and Information Science in Agriculture,2021,33 (9): 4-17.
[13]Elson M, Huff M, Utz S. Metascience on peer review: testing the effects of a study' s originality and statistical significance in a field experiment [J]. Advances in Methods and Practices in Psychological Science,2020,3 (1): 53-
[14]Tang G. Analysis on the development and research of preprints[J]. Publishing and Printing,2020 (2): 61-69.
[15]Jia J. Problems and countermeasures of scientific information dissemination on preprint platforms in the context of COVID-19—taking bioRxiv and medRxiv as examples[J]. Communication and Copyright,2021 (7): 83-85.
[16]Hu K, Liu H, Lu S, et al. Research on peer review of scientific journals in an open science environment[J]. Acta Editologica,2019,31 (6): 610-613.
[17] Science Media Centre. the preprint dilemma: good for science, bad for the public? A discussion paper for the scientific community [EB/OL]. [2022-8-09]. https://www.sciencemediacentre.org/the-preprint-dilemma-good-for-science-bad-for-the-public-a-discussion-paper-for-the-scientific-community/.
[18]Wingen T, Berkessel J, Dohle S. Caution, preprint! brief explanations allow nonscientists to differentiate between preprints and peer-reviewed journal articles [J]. Advances in Methods and Practices in Psychological Science,2022,5 (1): 172-174.
[19] Fraser N, Brierley L, Dey G, et al. The evolving role of preprints in the dissemination of COVID-19 research and their impact on the science communication landscape [J]. PLOS Biology,2021,19 (4): e3000959.
[20]Sun Y, Chen Y, Jiang Z, et al. Research on preprint recognition policies from the perspective of open science[J]. Digital Library Forum,2021 (6): 2-12.

[21]Li Z, Liu X. Characteristic analysis of open peer review research at home and abroad[J]. Chinese Journal of Scientific and Technical Periodicals,2021,32 (12): 1594-1602.
[22]Sheng Y, Chu J. Research progress on quality control methods for peer review[J]. Publishing Science,2018,26 (5): 46-53.
[23]Mizzaro S. Quality control in scholarly publishing: a new proposal [J]. Journal of the American Society for Information Science and Technology,2003,54 (11): 989-1005.
[24]Martinez-Saucedo M, Tellez-Camacho S, Aquino-Jarquin G, et al. Post-publication peer review: another sort of quality control of the scientific record in biomedicine [J]. Gaceta Medica de Mexico,2021,156 (6): 533-536.
[25]Xie H, Liu X. Empirical research on open review operation models of preprint platforms[J]. Chinese Journal of Scientific and Technical Periodicals,2021,32 (10): 1227-
[26]He Y, Tian K, Fu JY. An incentive mechanism-based framework to assure the quality of self-organizing peer review in preprint [J]. Data Technologies and Applications,2021,55 (5): 609-621.
[27]Wang L, Yao Y. Design of four paper-reviewer matching rules in self-organizing peer review mechanisms[J]. Journal of Intelligence,2018,37 (3): 142-145+151.
[28]Shi J, Miao J, Li M. Research on self-organizing peer review and incentive mechanisms for preprint systems[J]. Modern Information,2019,39 (12): 88-
[29]Fu J, He Y. Research on token incentive mechanisms for self-organizing peer review of preprints[J]. Chinese Journal of Scientific and Technical Periodicals,2021,32 (1): 23-27.
[30]Luo J, Liu J. Construction of copyright policy content for preprint platforms[J]. Chinese Journal of Scientific and Technical Periodicals,2020,31 (1): 24-31.
[31]Zhou Y. Investigation and enlightenment of domestic and foreign preprint systems[J]. Library World,2021 (3): 60-68.
[32]Wang Z. The scientific communication function of preprints and its multi-dimensional evaluation[D].Dalian: Dalian University of Technology,2020.
[33]Zhang Z, Huang J, Chen X, et al. Policy trends and challenges in scientific preprint repositories[J]. Bulletin of National Natural Science Foundation of China,2019,33 (3):219-
[34]Liu G. The evolution of academic activity organization systems and its enlightenment for practice-oriented management research[J]. Chinese Journal of Management,2011,8 (6):811-819.
[35]Wu S, Li Z. The impact of open access of scientific journals on scientific institutions[J]. Chinese Journal of Scientific and Technical Periodicals,2017,28 (11):979-985.
[36]He Y. The ethical basis of peer review in academic publishing[J]. Journal of Henan University (Social Science Edition),2020,60 (3):142-148.
[37]Sun C, Lin P, Chen W. Analysis of peer review time lag in medical journals in the 'Internet+' era[J]. New Media Research,2017,3 (5):114-
[38]Tian Y, Wu K, Zhao Y, et al. Wikipedia information content review model

and its reference for traditional journal review[J]. Information Theory and Practice,2010,33 (12):92-96.
[39]Zhang Z, Huang J, Wang Y, et al. Research on main development trends of international preprint platforms[J]. Digital Library Forum,2017 (10): 2-7.
[40]Xie H, Liu X. Review of foreign preprint platform research[J]. Science-Technology & Publication,2020 (6): 21-27.
[41]Zhu J, Zhang Z. Investigation and enlightenment on the rights and interests of participants in preprint academic exchange systems[J]. Chinese Journal of Scientific and Technical Periodicals,2022,33 (10):
[42]Tang G. Reconstruction and re-creation: the impact of preprint platforms on the scientific communication system[J]. Science Research Management,2021,39 (10): 1729-1735+1831.
[43]Yang S. Research on typical models of cooperation between preprint repositories and traditional journals[J]. Science-Technology & Publication,2020 (7): 130-136.
[44]Sun H, Liu Y, Fang L. Methodology of case study[J]. Science Research Management,2004 (2): 107-112.
[45]Hou Z. Research and enlightenment on arXiv preprint services[J]. Library Work and Study,2019 (2): 47-54.
[46]Chen Y, Wang Z, Liu Z, et al. Research on the academic influence of preprints—taking arXiv self-archived papers as an example[J]. Journal of the China Society for Scientific and Technical Information,2019,38 (8): 815-825.
[47]Zhang Z, Zhang S, Gu L, et al. Investigation and analysis of the current status of Chinese researchers' awareness and use of arXiv[J]. New Technology of Library and Information Service,2014 (Z1): 1-8.
[48]Batiz-Lazo B, Krichel T. A brief business history of an online distribution system for academic research called NEP, 1998-2010 [J]. Journal of Management History,2012,18 (4): 445-468.
[49]Li X, Zhang Z. Participants and their roles in the preprint academic exchange ecosystem[J]. Chinese Journal of Scientific and Technical Periodicals,2022,33 (10): 1321-
[50]Tang G. The history, characteristics and enlightenment of foreign preprint platform construction[J]. Chinese Publishing Journal,2021 (3): 144-155.

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