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Research on International Dissemination Strategies for Scientific and Technological Journals Under Intelligent Recommendation Algorithms: A Case Study of Journals Selected for the Excellence Action Plan for China Science and Technology Journals

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Abstract

Objective: In the era of artificial intelligence, intelligent recommendation algorithms offer new approaches for the international dissemination of scientific journals. This study aims to analyze the current status and challenges of applying intelligent recommendation algorithms in Chinese scientific journals, and to explore how these journals can leverage such algorithms to enhance their international reach. Methods: Based on the compatibility between intelligent recommendation algorithms and international journal dissemination, 280 journals from the "Excellence Action Plan for Chinese Science and Technology Journals" were selected as samples. Attribute data reflecting the application of intelligent recommendation algorithms in these sample journals were collected, and a comprehensive methodology incorporating statistical analysis, content analysis, and comparative analysis was employed to investigate the existing problems. Results: The sample journals exhibit insufficient utilization of platforms with recommendation capabilities; user profile data require further improvement; international cooperation and exchange need strengthening; and inadequate attention is devoted to overcoming language barriers. Conclusion: To effectively implement intelligent recommendation algorithms and achieve precise international dissemination of scientific journals, strategies may be adopted including: leveraging existing international dissemination platforms while advancing independent platform development; providing more effective data for intelligent recommendation algorithms; enhancing international cooperation to expand dissemination channels and influence; and, while encouraging the launch of English-language journals, intensifying the translation and editing of Chinese scientific

research outputs.

Full Text

Research on International Communication Strategies for Scientific Journals Under Intelligent Recommendation Algorithms—A Case Study of Journals Selected in the "Excellence Action Plan for China Science and Technology Journals"

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Abstract

Purpose: This study analyzes the current status and challenges of applying intelligent recommendation algorithms in Chinese scientific journals, and explores how these journals can leverage such algorithms to enhance international communication. **Methods:** Beginning with an analysis of the compatibility between intelligent recommendation algorithms and the international communication needs of scientific journals, we selected 280 journals from the "Excellence Action Plan for China Science and Technology Journals" as our sample. We collected attribute data representative of these journals' application of intelligent recommendation algorithms and employed comprehensive methods including statistical analysis, content analysis, and comparative analysis to investigate existing problems. **Results:** The findings reveal that sample journals underutilize platforms with recommendation capabilities, require further improvement in user attribute data collection, need strengthened international cooperation and exchange, and pay insufficient attention to overcoming language barriers. **Conclusion:** To effectively apply intelligent recommendation algorithms and achieve precise international communication, scientific journals should adopt strategies including: utilizing existing international communication platforms while advancing independent platform construction; providing more effective data for intelligent recommendation algorithms; strengthening international cooperation to expand communication channels and influence; and encouraging the establishment of English-language journals while intensifying translation

and editing efforts for Chinese research outputs.

Keywords: intelligent recommendation algorithms; scientific journals; international communication; strategies

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1.1 Academic Resource Overload and Insufficient International Exposure

The 52nd "Statistical Report on China's Internet Development" released by the China Internet Network Information Center shows that China's internet user base has reached 1.079 billion, establishing the internet as the central hub for information dissemination. In the academic resources domain, the proliferation of academic literature on online platforms has created an increasingly severe problem of academic resource overload. On one hand, researchers must invest substantial time searching for truly useful academic resources. According to data from the U.S. National Science Foundation, researchers spend 51% of their total research time on literature collection, resulting in low research efficiency. On the other hand, for scientific journals, the lack of search exposure for certain academic resources leads to poor international communication outcomes for the journals publishing them.

Intelligent recommendation algorithms, characterized by their real-time and dynamic nature, offer a novel solution to academic resource overload. Faced with the continuous emergence of academic literature on the internet, these algorithms can rapidly capture and analyze new data streams to achieve real-time recommendations, effectively addressing the overload problem. This agile recommendation mechanism not only enables researchers to stay abreast of the latest research trends but also facilitates immediate interdisciplinary and international collaboration, significantly enhancing research efficiency.

1.3 Lack of Systematic Summarization and Insufficient Driving Force for International Communication

China's scientific journal international communication efforts are currently experiencing "profound changes unseen in a century." In this new development stage, General Secretary Xi Jinping has specifically emphasized the need to "strengthen research on international communication theories and master the laws of international communication," providing actionable guidance for enhancing the international communication capacity and effectiveness of Chinese scientific journals. The complexity of international communication has resulted in a lack of comprehensive analysis and integration of international communication patterns, preventing the formation of sustainable development strategies.

Intelligent communication technologies represented by AI have fundamentally transformed traditional communication logic across multiple dimensions, including communication subjects, channels, content, and environments. Intelligent

recommendation algorithms can analyze and process large volumes of seemingly unrelated, fragmented individual behaviors to identify inherent relationships and characteristics, forming precise understandings of underlying patterns. These algorithms reflect overall trends while recording individual circumstances, uncovering important correlations among individuals and between individuals, thereby enabling precise recommendations for scientific journals and addressing the problem of insufficient driving force for international communication.

2.1 Research Design and Framework Construction

Chinese scientific journals currently apply intelligent recommendation algorithms primarily through three approaches: first, by relying on international academic resource platforms or academic social networking platforms with embedded recommendation functions, such as ResearchGate, TrendMD, and Academia.edu; second, by leveraging search recommendation algorithms embedded within web search engines and academic search engines, optimizing content related to researchers, topics, keywords, and abstracts to improve search rankings and achieve global exposure; and third, by purchasing intelligent recommendation services from technology companies, such as those provided by Zhipu AI—a method that involves paid services and is not the focus of this study.

Therefore, this study examines Chinese scientific journals' application of intelligent recommendation algorithms by first investigating their utilization of platforms with recommendation functions, and second, assessing their collection and optimization of data required by search engine-based recommendation algorithms. The "Excellence Action Plan for China Science and Technology Journals" (hereinafter referred to as the "Excellence Action Plan"), launched on November 22, 2019, represents a significant initiative aimed at enhancing the international competitiveness and influence of domestic scientific journals. The selected journals directory, including leading journals, key journals, tiered journals, and high-startup new journals, serves as a benchmark for journal quality and influence in China. This study investigates these selected journals' use of recommendation-enabled platforms and their collection and optimization of data required by search engine recommendation algorithms to explore current conditions and challenges. The research framework is illustrated in [FIGURE:1].

2.2 Research Methods

This study employs multiple investigative approaches. First, ResearchGate (https://www.researchgate.net/), an academic social networking platform with embedded intelligent recommendation functions that has attracted 25 million scholars from over 190 countries, facilitates academic networking, research sharing, collaboration opportunities, academic discussions, and impact tracking. Its recommendation capabilities enable precise dissemination of research outputs.

Therefore, scientific journals' presence and active operation on ResearchGate can significantly enhance their exposure and influence while promoting academic interaction and content sharing. This study examines the selected journals' utilization of ResearchGate to reflect their adoption of platforms with recommendation functions.

Second, in the domain of academic resource recommendation, intelligent recommendation algorithms rely on several types of data: (1) researcher attribute data, including basic information such as age, gender, occupation, title, and research field; (2) researcher behavioral data, including browsing, reading, downloading, and bookmarking activities; (3) research output content attribute data, such as titles, abstracts, and keywords; (4) academic association data, including cooperation relationships between journals and citation relationships among scholars; and (5) social network data from academic social platforms. This study focuses on data that scientific journals need to improve and update for algorithmic application, specifically examining the collection and optimization of user attribute data, content attribute data, and academic association data.

2.3 Data Sources and Acquisition Methods

This study selected representative academic social networking platforms and attribute data required by intelligent recommendation algorithms for analysis. Data acquisition proceeded through five approaches. For platform utilization, we searched ResearchGate using the English names of the 280 journals in the "Excellence Action Plan" to determine account establishment and community interaction. For user attribute data, we examined ORCID collection and author research direction information. ORCID serves as a "global academic ID" for researchers, and collecting this information helps establish a transparent, traceable, and high-quality academic publishing ecosystem. Research direction information facilitates the construction of open, collaborative, and organized academic communities, enabling recommendation algorithms to better understand researchers' academic backgrounds and provide customized services.

For content attribute data, we downloaded 280 articles through CNKI, Wanfang Data, VIP, Baidu Scholar, Panda Scholar, and official journal websites to examine English abstracts and keywords. For academic association data, we investigated cooperation with international publishers through official website queries, examining whether journals were published by international publishers, whether publisher logos appeared on journal covers, and whether official websites contained publisher links. We also verified cooperation status through search engines. For impact factor data, we obtained the latest impact factors for journals included in the Journal Citation Reports through LetPub and official journal websites. For Chinese journals not indexed in the SCI database, we retrieved corresponding impact factor data from CNKI by verifying sponsoring institutions.

3.1 Underutilization of Platforms with Recommendation Functions

To investigate the utilization of recommendation-enabled platforms among the 280 journals in the "Excellence Action Plan," we examined their registration status on ResearchGate. The results, presented in [FIGURE:2], reveal that 279 journals (99.64%) had not registered accounts on ResearchGate, while only one journal (0.36%) had established a presence. Notably, *Carbon Energy* was the sole journal among the 280 that had registered an account on ResearchGate (as shown in

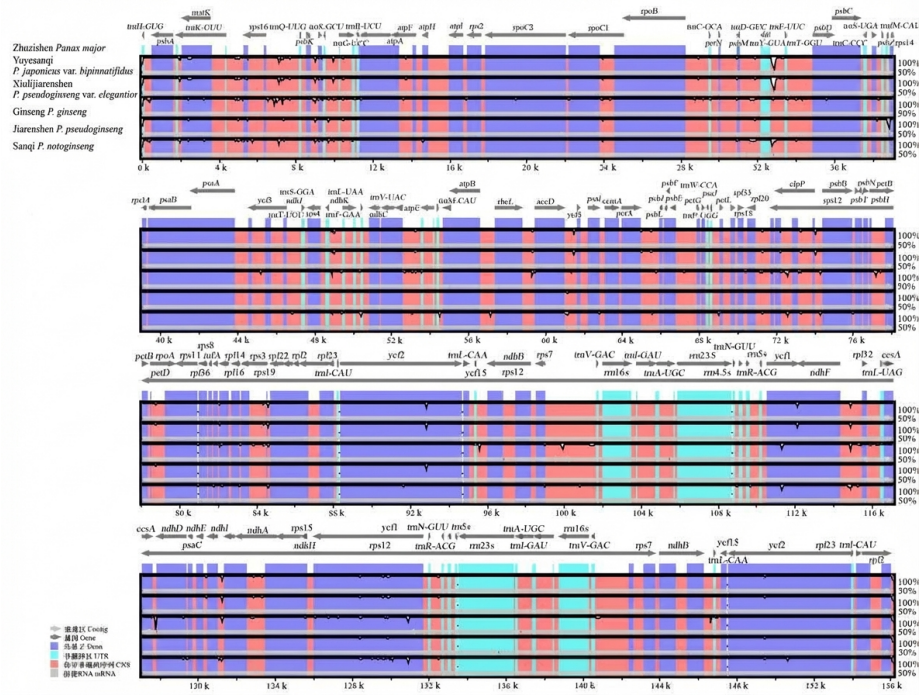

Figure 1: Figure 3

) and maintained regular updates and interactions. These findings demonstrate that Chinese scientific journals significantly underutilize international academic community platforms with recommendation functions.

3.2 Need for Further Improvement in User Attribute Data

Intelligent recommendation algorithms can identify researcher similarity groups to recommend academic papers to target audiences. To investigate data collection for search engine algorithms, we examined whether these journals collected author user attribute data. Specifically, we investigated ORCID information collection and whether author profiles included research direction descriptions. The results, depicted in [FIGURE:4] and [FIGURE:5], show that only 28 journals

(10%) collected ORCID information, and a mere 16% included author research directions in their profiles. Overall, most selected journals perform inadequately in user data collection. Insufficient user attribute data may prevent recommendation systems from achieving effective recommendations when crawling data.

3.3 Need for Strengthened International Cooperation and Exchange

Collaboration with renowned academic institutions provides intelligent recommendation algorithms with academic association data while enhancing academic authority and credibility. Notably, Elsevier has applied intelligent recommendation technology on its online platforms, and Springer Nature journals have launched Recommended features based on recommendation algorithms. Cooperation with such institutions can increase journal exposure frequency and promote global dissemination of academic achievements.

According to the *Blue Book of China's Science and Technology Journals (2022)*, China has 4,482 Chinese-language and 420 English-language scientific journals, with over 400 journals cooperating with international publishers—representing only 8% of the total. To further examine the selected journals' emphasis on academic association data, we investigated their cooperation with international publishers and calculated average impact factors by publisher category to assess the influence of international collaboration. The results are presented in [FIGURE:6] and [FIGURE:7].

As shown in [FIGURE:6], 173 journals (62%) in the "Excellence Action Plan" have established cooperation with international publishers, substantially higher than the national average. Cooperation with Elsevier and Springer Nature dominates, accounting for over 50% of collaborative relationships. Journals engaged in international cooperation demonstrate significantly higher average impact factors (6.78) compared to non-cooperating journals (2.48)—a 2.73-fold difference. According to [FIGURE:7], journals cooperating with Oxford University Press show particularly high impact factors, averaging 10.18. Additionally, journals cooperating with Springer Nature and Elsevier also perform excellently, with average impact factors of 8.06 and 8.37, respectively. These results underscore the crucial role of international cooperation and exchange at the journal level.

3.4 Insufficient Attention to Language Barriers

To investigate the optimization of research output content attribute data, we examined the number of English-language journals among the selected journals. The data reveal that among the 280 journals, 102 are Chinese-language, 176 are English-language, and 2 are bilingual. This distribution highlights that English-language journals dominate the "Excellence Action Plan," reflecting its goal of not only expanding the influence of Chinese journals but also enhancing the international impact of Chinese scientific journals.

Our comparative analysis of impact factor data shows that English-language journals achieve an average impact factor of 6.94, while Chinese-language jour-

nals average only 2.29—a threefold difference. Furthermore, the highest impact factor among English journals reaches 44.1, compared to just 6.95 for Chinese journals. These results, detailed in [FIGURE:8], demonstrate that English-language journals generally achieve higher impact factors, while also revealing that domestic Chinese-language journals suffer from relatively low international recognition and citation rates, partly due to language barriers.

4.1 Utilize Existing International Communication Platforms While Advancing Independent Platform Construction

First, scientific journals should strengthen their awareness of utilizing international communication platforms. Journals can cooperate with international academic social platforms that already feature intelligent recommendation functions, such as ResearchGate and Academia.edu. By establishing official pages on these platforms and sharing academic achievements, journals can increase their international communication opportunities. Account homepages should be clear, attractive, and highlight the most representative and influential achievements. Through active management and optimization of page content and regular updates, journals can enhance their platform exposure. Additionally, journals should actively interact with other researchers on these platforms by responding to comments, questions, and suggestions, demonstrating commitment to academic social networking, enhancing the 亲和力 of international communication, and providing traction for academic association data. Journals should also regularly track and analyze their promotional effectiveness using platform analytics tools. For instance, ResearchGate's analytical tools provide key data on page performance, including visits, downloads, and citations, enabling data-driven adjustments and optimization.

Furthermore, journals should actively promote the construction of independent digital publishing and communication platforms. Currently, Chinese scientific journals' international communication efforts primarily depend on digital publishing platforms built by international publishers. To achieve precise international communication, journals must both "borrow boats to go to sea" and "build their own boats to go to sea," thereby mastering the platform tools themselves. Through the "Excellence Action Plan," scientific journals can secure special funding to build influential independent digital publishing and communication platforms. By embedding personalized recommendation functions, these platforms can enhance the discoverability and accessibility of Chinese scientific journals within the international research community and academic circles, thereby increasing their exposure in the global academic community.

4.2 Provide More Effective Data for Intelligent Recommendation Algorithms

First, precise international communication depends on the accurate construction of researcher user profiles. Scientific journals should guide authors to improve user attribute data and generate behavioral data. On one hand, journals should encourage researchers to complete their profiles on personal websites, journal systems, and open academic platforms, and to regularly update and share their research findings. On the other hand, journals should encourage active participation in academic social network interactions to generate sufficient user behavioral data. Only with detailed user attribute and behavioral data can recommendation algorithms construct more accurate user profiles, provide more precise recommendation services, and enhance international communication efficiency.

Second, journals should require researchers to optimize content attribute data, emphasizing the refinement of paper titles, abstracts, and keywords. Attention should be paid to the connotation and extension of keywords and abstracts, as well as the use of academically recognized and easily promotable language. Intelligent recommendation algorithms can use this information to accurately recommend relevant academic papers to researchers in related fields, increasing the probability of research outputs being read and cited, thereby enhancing the journal's international influence.

Finally, journals can innovate publishing models such as open access and digital publishing. These innovative models and technologies can provide more effective data for intelligent recommendation algorithms, thereby increasing journal and paper readership and citations, and improving the dissemination efficiency of academic papers. Moreover, they can make research achievements more easily accessible and citable by the international research community and academic circles, expanding their influence in the global academic community.

4.3 Strengthen International Cooperation to Expand Communication Channels and Influence

Currently, international cooperation remains one of the most important methods for scientific journals to achieve international communication. Specifically, journals can establish cooperative relationships with renowned academic institutions and international publishers. Such cooperation enables journals to share databases and recommendation system resources from international publishers. Additionally, journals can organize international academic conferences, forums, and other exchange activities to build an international academic social network "circle of friends." Intelligent recommendation algorithms can recommend academic resources to "in-circle" academic peers based on these social network relationships, thereby broadening journals' international communication channels.

Furthermore, journals should guide authors to strengthen collaborations with

influential scholars, particularly highly-cited scholars within scientific fields. Intelligent recommendation algorithms utilize cooperation relationships among researchers for recommendations. By jointly publishing research reports, participating in academic activities, or co-authoring papers with high-impact scholars, journals can increase the exposure of their own achievements.

4.4 Encourage English-Language Journal Development While Strengthening Translation and Editing of Chinese Research

On one hand, the construction of English-language scientific journals should be strengthened. Undeniably, due to the widespread use and popularity of English, English-language scientific journals are more likely to achieve international communication. Moreover, most language models currently used in mainstream academic resource personalization recommendation algorithms are trained on English data, enabling more precise recommendations for English-language journals. China currently has relatively few English-language publications and limited output volume, equivalent only to the scale of medium-sized international publishers, indicating substantial room for growth. The development of English-language scientific journals should continue to be advanced to enhance the international communication capacity of Chinese scientific journals.

On the other hand, policy support for translation and editing of Chinese scientific journals should be increased. Some excellent Chinese-language scientific journals face language barriers that limit their effective international dissemination. To ensure the exposure of outstanding Chinese research achievements on the international stage, increased efforts in editing and translation are necessary, including providing financial, human resources, and technical support for English extended abstracts and other initiatives to break down language barriers in international communication and promote more outstanding scientific journals "going global."

In the era of artificial intelligence, intelligent recommendation algorithms offer new solutions to challenges such as academic resource overload, insufficient international communication effectiveness, and lack of systematic summarization. Currently, Chinese scientific journals exhibit problems including underutilization of recommendation-enabled platforms and incomplete data collection for intelligent recommendation algorithms. To enhance international communication effectiveness, scientific journals can achieve improvements through platform utilization, provision of effective data for algorithms, strengthened international cooperation, and resolution of language barriers. Since this study focuses on scientific journals without dedicated discussion of researchers and management departments, it may have limitations in comprehensiveness. Future research could conduct specialized investigations on how researchers, scientific journals, and management departments can form positive interactions with technology, enriching application cases of intelligent recommendation algorithms to provide references for precise international communication of Chinese scientific journals.

Author Contributions: XIA Liyun: conceptualized the study, designed the research framework, drafted the manuscript, and revised the final version; XU Minyun: conducted literature search, drafted and revised the manuscript; DING Yinan: designed the research ideas and scheme, revised the final version; DAI Jianhua: provided technical guidance and revised the final version.

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