Knowledge Translation Pathways of Scientific Journals from an Open Science Perspective

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Abstract

[Objective] To investigate the functional positioning of scientific journals within the conceptual and policy framework of open science, fully mobilize and leverage their positive role in the knowledge production network, and innovate the pathways for knowledge transformation and application in scientific journals. [Method] Through textual analysis, case study, and logical argumentation, this study conducts a comparative analysis between the knowledge transformation pathways of scientific journals under the open science paradigm and those of traditional scientific journals, thereby extracting and summarizing innovative strategies for knowledge transformation pathways. [Result] Focusing on different stakeholders including researchers, academic institutions, governments, and the public, diversified knowledge transformation pathways and an integrated cluster development model for scientific journals are proposed. [Conclusion] Under the open science perspective, scientific journals occupy the position of linking actors within the knowledge production network, functioning as bridging channels. By actively transforming and innovating knowledge transformation pathways, they can improve the efficiency and quality of knowledge transformation.

Full Text

Research on Knowledge Transformation Pathways in Scientific Journals from the Perspective of Open Science

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Abstract

[**Purpose**] This study explores the functional positioning of scientific journals within the conceptual and policy framework of open science, aiming to fully mobilize and leverage their active role in knowledge production networks while innovating pathways for knowledge transformation and application. [**Methods**] Through text analysis, case studies, and logical demonstration, we conduct a comparative analysis of knowledge transformation pathways in scientific journals under open science versus traditional paradigms, distilling innovative strategies for knowledge transformation. [**Findings**] We propose diversified knowledge transformation pathways and integrated cluster development models for scientific journals, targeting different stakeholders including researchers, academic institutions, government agencies, and the public. [**Conclusion**] From the open science perspective, scientific journals serve as linking actors in knowledge production networks, functioning as bridge channels. By actively transforming and innovating knowledge transformation pathways, they can enhance both the efficiency and quality of knowledge conversion.

Keywords: scientific journals; knowledge transformation; knowledge network; academic community; open science

With the rapid development of digital information technology and artificial intelligence, scientific knowledge production and transformation increasingly exhibit highly networked characteristics. The efficiency of knowledge exchange and the frequency of knowledge flow among research institutions, scientific journals, government departments, social organizations, technology enterprises, and the public have improved dramatically, substantially enhancing the speed, volume, and quality of scientific knowledge production and transformation while making storage and access more convenient.

The concept of open science, formally proposed after developmental stages of open access and open data, has gained active response and support from the global academic community. Open science is becoming a new paradigm and concept for scientific knowledge production and transformation worldwide, representing the emerging direction and trend in the evolution of contemporary scientific knowledge production and conversion networks [1].

In the era of "big science," research demonstrates open cooperation and sharing trends both horizontally through interdisciplinary integration and vertically through deep fusion of science, technology, engineering, and industry. Under this context, knowledge production through independent, closed laboratory research appears inefficient and involves redundant resource investment. If the entire scientific research process can achieve openness, transparency, and sharing, it would establish a solid information and data foundation for promoting collaborative innovation among diverse actors and multiple laboratories. Thus, open science extends beyond open access and open data toward open experimental processes and scenarios, expanding from research outputs to research data and further to the entire lifecycle and all stages of scientific research [2].

UNESCO has explicitly stated that open science involves the broad sharing and use of all project information, experimental data, and knowledge outputs related to scientific research through the joint participation of all stakeholder actors. Its objective is to make scientific research resources and information more accessible, knowledge outputs more openly available, research processes more transparent, and scientific knowledge production and transformation more efficient and effective [3]. In recent years, domestic and international research on open science has increased significantly, focusing on concepts and characteristics [4], specific open science actions including open access, open review, open project initiation, and open experimental data [5], the European open science system [6], open science policies in the United States [7], United Kingdom [8], Japan [9], and Canada [10], Chinese open science practices [11], development characteristics and journal evaluation under open science [12], construction of journal impact indicators [13], and coping strategies for scientific journals [14].

Building upon these theoretical resources, this paper conceptualizes open science as the networked and systematic development of scientific knowledge production and transformation pathways. In terms of content, open science provides open access not only to scientific knowledge outputs but also to all related information and data. In terms of process, open science encompasses not only open review and open publishing of knowledge outputs but also openness, transparency, and synchronous interaction throughout the entire process of knowledge production, transformation, diffusion, application, and redevelopment. Therefore, open science represents both a higher stage of public participation in scientific development and a more advanced form of scientific knowledge production and transformation in the digital age.

Within this framework, the role and status of scientific journals in scientific knowledge production and transformation networks have changed significantly. Under open science, traditional knowledge transformation pathways in scientific journals can no longer meet the communication needs among different actors in knowledge networks. The structural hole position and functions of scientific journals have been strengthened. Scientific journals urgently need to continue innovating knowledge transformation and diffusion pathways to promote knowledge exchange efficiency in scientific knowledge networks, enhancing real-time interaction and collaborative response among research institutions, government departments, social organizations, technology enterprises, and the public through open access, open data, and open research processes. This shifts the traditional linear research paradigm of “knowledge production—knowledge transformation—knowledge diffusion—knowledge application” toward a synchronous research paradigm centered on “knowledge transformation and diffusion” that links “knowledge production to application,” thereby better facilitating full knowledge flow and collaborative cooperation among different actors in scientific knowledge networks.

1.1 Concepts of Knowledge Production and Knowledge Transformation

The evolution of knowledge production modes has progressed from interest-driven free exploration to the institutionalization of scientific knowledge production represented by the Paris Academy of Sciences and the Royal Society of London. In the early 19th century, marked by the establishment of the University of Berlin, knowledge production formally entered the "academic science" stage. By the mid-to-late 20th century, knowledge production gradually deviated from the traditional "ideal" state toward "post-academic science"—an extension of academic science into industrial domains operating under market organizational principles in an "application context," pursuing the commercial value and market application of knowledge and emphasizing "creating value with knowledge." In 2010, Carayannis and Campbell further proposed Mode 3 knowledge production systems, attempting to integrate the logics and principles of Mode 1 and Mode 2 to construct knowledge clusters and innovation networks with multi-actor participation, thereby achieving multi-sector collaborative knowledge production [15]. The network nature of scientific knowledge production has become a prominent characteristic.

Research on knowledge transformation has primarily focused on knowledge transfer and diffusion from developed to developing countries, with limited specialized studies on knowledge transformation within knowledge production systems, often subsumed under general research on knowledge production modes. Since this study emphasizes the positioning and functions of scientific journals in knowledge production systems—corresponding to knowledge production by research institutions, knowledge application development by technology enterprises, and public understanding of science—this paper specifically extracts the concept of "knowledge transformation" from general knowledge production research, focusing on how scientific journals can better serve research institutions' knowledge production and facilitate knowledge transformation pathway innovation for technology enterprises and public participation in science under open science. Therefore, knowledge transformation in this study refers to the processing and re-creation of discovered and validated scientific knowledge into diverse knowledge outputs, a concept parallel to knowledge production and knowledge application.

1.2 Research Methods

This paper employs text analysis, case studies, and logical demonstration as primary methods to conduct comparative research on knowledge transformation pathways in scientific journals under open science versus traditional paradigms, distilling innovative strategies for knowledge transformation pathways. First, we use textual interpretation and analysis to organize relevant research on open science and knowledge transformation, refining the connotations of open science and the concept of knowledge transformation based on existing studies. We also examine literature on the functional positioning and business operations of

scientific journals, analyzing current phenomena and causes of lagging development in scientific journals. Using selected scientific journals as case studies, we identify deficiencies in current knowledge transformation pathways under open science and explore functional transformations in scientific journal knowledge transformation. Finally, through logical demonstration and based on the special status and important functional transformations of scientific journals under open science, we propose innovative strategies and development measures for scientific journal knowledge transformation pathways.

2 Traditional Knowledge Transformation Pathways in Scientific Journals and Their Deficiencies

With a history spanning several centuries, traditional knowledge transformation pathways in scientific journals have centered primarily on the publication of scientific papers, with relatively clear positioning and functions within traditional academic communities. At the macro level, traditional pathways link knowledge production and knowledge application, encompassing the recording, collection, review, publication, and dissemination of scientific discoveries and research outputs. They constitute an important link in knowledge production systems and serve as crucial channels for national scientific research development, technological economic growth, and international academic discourse power building. At the micro level, traditional pathways serve researchers' need to present and demonstrate their research achievements and institutions' needs for discipline building and research dynamics, functioning as important vehicles for scientific knowledge exchange and communication and as carriers for research output storage. Additionally, traditional pathways reflect the important goal of scientific journal management departments and publishing units to provide intellectual support and knowledge services for national strategic needs through resource allocation methods such as funding support, institutional design, and distribution channels. Specifically, traditional knowledge transformation pathways can be summarized as: centering on scientific paper publication, following linear knowledge transformation paths, and conforming to traditional academic community order (as shown in [Figure 1: see original paper]).

First, the pathway centers on scientific paper publication. Traditional knowledge transformation pathways revolve around scientific journals, with paper review, editing, and publication as core tasks and primary objectives. For centuries, scientific journals have used scientific papers as tangible products, researchers' outputs, literature materials, and communication carriers within academic communities. Since the 20th century, electronic information technology has enabled the development of electronic journals, electronic paper databases, and literature collection and search services, shifting from single print journals to diverse electronic paper forms and literature management and analysis services. However, journal publishers and database platforms often belong to different entities, with scientific journals rarely involved in database services or literature analysis, leaving their service functions unenhanced. Traditional pathways focus

on providing researchers with important platforms for publishing achievements and accessing literature, offering review, evaluation, recognition, and dissemination services for research outputs, with published papers serving as "passports to achievement" within academic communities. Consequently, traditional pathways are content-dominated routes centered on scientific papers, with severe deficiencies in secondary transformation and development of scientific knowledge and attention to other related information. Awareness of value-added services remains insufficient, and service content and scope require further expansion.

Second, the pathway follows a linear knowledge transformation model. Traditional pathways focus on paper editing and publication along a single "author-editor-reader" trajectory, presenting a linear, unidirectional, and closed process. Researchers (authors) submit manuscripts to journals (editors), which then distribute edited papers to other researchers (readers). Scientific journals concentrate their knowledge transformation efforts on editing and distribution. This manifests as a "heavy front-end, light back-end" phenomenon, with excessive investment in manuscript solicitation, review, editing, publication, and distribution, but insufficient attention to post-publication transformation, development, and diffusion. Additionally, "reverse services" for researchers are seriously inadequate; traditional pathways fail to provide reverse or backward research support services, such as timely and dynamic feedback of effective data and information on research topic selection, trends, and literature analysis to frontline researchers. Under such traditional pathways, scientific journals not only fail to establish diffusion channels with the broad public but also cannot build efficient two-way interaction channels with researchers. Information exchange and interaction among various knowledge actors remain untimely and unsmooth, with limited imagination for diversified knowledge transformation and multidirectional knowledge flow.

Third, the pathway conforms to traditional academic community order. Scientific journals serve as formal platforms for gathering new scientific discoveries, knowledge, and achievements, and as important venues for intellectual collision, academic interaction, research services, and knowledge dissemination. With rapid development of scientific research, scientific journals have become systematic, large-scale, and standardized. However, traditional knowledge transformation pathways have not extended their service targets to the broader society, failing to assume the "structural hole" function in knowledge production network systems or play a linking and bridging role. Under traditional pathways, scientific journals occupy a subordinate position within the autonomous traditional academic community. First, review and publication opinions primarily come from traditional peer review within academic communities, with limited weight given to journals' own review opinions. Second, service targets remain largely within traditional academic community boundaries, excluding broader knowledge actors such as technology enterprises, government departments, and the public. Third, scientific journals only perform editing and publishing functions for traditional academic communities, with their roles restricted and constrained to varying degrees.

Since the 21st century, particularly with the development of information technology and the promotion of open science concepts and movements, the knowledge economy has emerged as a new economic form following agricultural and industrial economies. Knowledge production and transformation network systems have expanded rapidly, with knowledge value creation and mining becoming important drivers of the new economy. Knowledge production, transformation, and application innovation services have become important business and core competencies for scientific journals in providing problem-solving solutions for knowledge actors. The era of scientific journals centered solely on paper editing and publication is passing, while an era focused on providing customized and extended services for scholars, industries, and society has arrived [16]. Under open science, the knowledge transformation functions of scientific journals have changed significantly.

3 Transformation of Knowledge Transformation Functions in Scientific Journals Under Open Science

Scientific journals occupy structural hole positions in scientific knowledge production network systems, serving as bridges linking various knowledge actors and as important transformation channels in the chain from laboratory knowledge production to social market knowledge application. Centered on knowledge transformation, scientific journals perform highly specialized, in-depth, and dynamic tracking and direction-setting work at scientific frontiers, including reviewing knowledge production results, guiding and directing knowledge production, summarizing and refining new knowledge, and establishing associations and recombination among different types of knowledge. They satisfy diverse needs of multiple actors in knowledge network systems through knowledge transformation works, data, and information. Driven by digital technology and open science concepts, scientific journals undertake more linking and extended service functions beyond journal publishing. The *Opinions on Deepening Reform and Cultivating World-Class Scientific Journals* explicitly states: "Scientific journals inherit human civilization, gather scientific discoveries, and lead scientific development, directly reflecting national scientific competitiveness and cultural soft power," proposing that by 2035, China's scientific journals should rank among the world's top tier, "becoming an important hub for international academic exchange and scientific culture dissemination, making substantial contributions to building a science and technology powerhouse" [17].

The knowledge transformation function of scientific journals represents a comprehensive summary of their multifaceted functions regarding output content, data information, application services, and decision guidance throughout the entire intermediate process from new knowledge production to application. This functional transformation manifests primarily in six aspects: knowledge production service and guidance, knowledge application service and promotion, knowledge integration and evaluation, knowledge dissemination and diffusion, overall leadership and order maintenance of knowledge networks, and collabo-

rative knowledge innovation and cooperation among different actors (as shown in [Figure 2: see original paper]).

First, knowledge production service and academic guidance centered on scientific paper publication. Paper review, editing, and publication constitute the raison d'être and fundamental responsibility of scientific journals. The knowledge transformation function first manifests in publishing papers on new scientific discoveries, providing academic communities with platforms for presenting and exchanging new discoveries, knowledge, and achievements. On one hand, during paper review and editing, journals perform text revision and processing, which itself constitutes knowledge production service. On the other hand, during publication, journal staff naturally position themselves at the forefront of academic trends, enabling journals to provide research institutions and researchers with services on new research directions and topic selection. With close connections to academic communities and deep participation in scientific knowledge production practices, scientific journals possess clear advantages in guiding research trends and directions. However, current knowledge production service and guidance functions of Chinese scientific journals remain insufficient, with weak cultivation and incubation services around project topic selection and manuscript organization.

Second, knowledge application service and promotion for technology enterprises. A key characteristic of contemporary science is its guiding role for technology and industry. Basic research in scientific knowledge production can drive related technology application and product development, thereby promoting the rise and rapid development of strategic emerging industries. For example, the discovery of transistor scientific principles drove the high-speed development of semiconductor technology and electronic information industries. Research oriented toward industry has increasingly become mainstream. Consequently, how to efficiently transform new scientific discoveries and achievements into enterprise technology application and development has become an important issue in scientific and technological innovation and a new function and requirement for scientific journals beyond publishing papers.

Third, knowledge integration and evaluation of various scientific and technological achievements. As scientific research deepens, knowledge production processes exhibit clear domain subdivision trends, with increasingly specialized content and more focused research targets. Simultaneously, this subdivision necessitates integration and consolidation above it, leading many new discoveries and fields to display interdisciplinary and cross-disciplinary characteristics. Therefore, the value of scientific journals in gathering, integrating, analyzing, comparing, and presenting new knowledge has become increasingly prominent. The knowledge integration and aggregation effects of scientific journals have attracted widespread attention. Consequently, cluster development of scientific journals has become a hot topic, as it helps further strengthen the knowledge transformation functions of scientific journals in knowledge network systems.

Fourth, knowledge dissemination and diffusion for the public. Previously, knowl-

edge dissemination and academic exchange in scientific journals were confined within academic communities. Knowledge dissemination through papers and academic conferences was considered a special function for researchers, with clear boundaries. Paper publication and subscription within academic communities were viewed as fundamental functional attributes. However, with continuous development of public participation in science concepts and movements, along with improved higher education enrollment rates and public scientific literacy, more people can comprehend scientific papers. Although not members of academic communities engaged in research, many have developed or are developing habits of reading and organizing scientific papers and information due to various needs related to work or health. From the perspective of dissemination targets, the audience for scientific journal knowledge dissemination is expanding from academic communities to the broader public. Knowledge dissemination and diffusion for the entire society have become new indicators for evaluating scientific journal impact.

Fifth, overall leadership and order maintenance of knowledge production network systems. Due to the specialized nature of scientific research and the complexity of knowledge production networks, neither government departments nor technology enterprises can fully dominate the entire system, especially given the high uncertainty of basic exploratory research, which differs significantly from technology development and engineering projects. Consequently, academic community autonomy was proposed earlier as a feasible solution. However, as scientific knowledge dissemination and exchange have expanded beyond academic community boundaries, maintaining the entire knowledge network system through academic community power alone has become difficult. The natural linking bridge among research institutions, technology enterprises, government departments, and the public is scientific journals. Thus, leading and maintaining overall order in scientific knowledge production network systems has become a new function of scientific journals.

Sixth, promoting collaborative knowledge innovation and cooperation among different knowledge actors. In open science practice, knowledge transformation services for diverse knowledge actors represent a repositioning of scientific journals distinct from traditional paper publication services. Driven by open science actions and digital technology empowerment, knowledge production factors, data, outputs, application demands, and dissemination information flow more rapidly and with higher quality among different knowledge actors, improving knowledge production and transformation efficiency, drastically shortening cycles, and making efficient collaboration possible. In such a cyclical network system of knowledge production, transformation, application, and reproduction, scientific journals face not only paper authors and readers but all relevant actors in knowledge network systems. Collaboration among different actors creates numerous linking points and supply-demand matching needs, positioning scientific journals far beyond editors to become service providers for constructing and maintaining research collaborative relationships. Therefore, the functional positioning and operation models of scientific journals need to change, and their

knowledge transformation pathways require innovative breakthroughs.

4 Innovation Strategies for Knowledge Transformation Pathways in Scientific Journals Under Open Science

The open science concept and movement represent an inevitable trend driven by rapid development of digital technology and artificial intelligence. Digital technology enables online storage, transmission, download, and real-time interaction of comprehensive, three-dimensional, and multi-dimensional research data and information. Artificial intelligence enables timely dynamic search, archival organization, and precise presentation of massive scientific papers and research process data under algorithmic drive. Particularly, generative artificial intelligence technology has exerted disruptive and revolutionary impacts on knowledge production modes and research paradigms. Open science aims to break through traditional academic community boundaries, presenting the entire research process and complete information through open access, open data, and open interaction. Openness, interactivity, and public participation are important characteristics of the open science movement. Knowledge actors in knowledge production and transformation network systems have expanded to the entire society, the linking and bridging role of scientific journals has become prominent and strengthened, and nonlinear, networked interaction and collaborative cooperation among knowledge actors have been enhanced. Consequently, innovation strategies for knowledge transformation pathways in scientific journals under open science manifest primarily in five aspects (as shown in [Figure 3: see original paper]).

First, constructing a new academic community. Scientific journals should effectively utilize new technological tools to expand academic community boundaries from researchers and research institutions to broader technology enterprises, technology groups, government departments, social organizations, and the public, forming a maximally heterogeneous knowledge production network ecosystem and constructing a new academic community. Aligning with current trends of deep integration among scientific research, technological invention, product development, engineering innovation, and industrial development, scientific journals should proactively organize knowledge actors including research institutions, researchers, technology enterprises, government departments, and the public, efficiently matching knowledge supply and demand among different actors, promoting innovative flow and allocation of scientific papers and research data, strengthening knowledge associations, and deeply mining the potential value of research data. On one hand, this requires changing the traditional subordinate position to academic communities, redefining the positioning and functions of scientific journals within new academic communities, and continuously strengthening their organizational and cohesive roles. On the other hand, it requires changing traditional business scopes, redefining the value and role of scientific journals in new academic communities, and continuously exploring research frontiers and organizing joint research positions through business ap-

proaches such as research trend analysis, trajectory tracking, and topic setting, thereby leading the development of new academic communities and promoting higher-efficiency, higher-quality research development.

Second, fully playing the role of organizational bridge. Under open science, scientific journals are not only carriers for editing and publishing scientific papers but also "structural holes" in the entire knowledge production and transformation network—the new academic community—playing linking and bridging roles in the network ecosystem of knowledge production, transformation, dissemination, application, and reproduction. First, new knowledge production modes have transformed the traditional linear relationship of unidirectional submission from research institutions to journals. With keen insight into academic trends and capabilities in topic selection and manuscript organization, scientific journals can organize cross-boundary joint research activities across different actors, achieving two-way interaction with research institutions and strengthening their research organization capabilities. Second, open science advocates open data and public participation throughout the entire process from project initiation to experimentation, paper review, and achievement transformation. Interactive discussions between research institutions and the public require effective knowledge transformation by scientific journals, which serve both as intermediary links and as organizational hosts. Third, due to their central structural position in new academic communities and their central linking and outward radiating roles in research topic setting and paper review, scientific journals should strengthen research data and paper recording, archiving, and presentation while further enhancing their leading role in problem identification, project planning, research organization, interaction promotion, and research innovation. Scientific journal work serves as both the tail and the head of research.

Third, establishing journal clusters and communication matrices for multichannel, multi-format knowledge transformation, processing, and production. Under open science, knowledge transformation content in scientific journals includes not only paper publication but also richer content such as experimental data, lab notes, experimental scenarios, and achievement introductions, posing diversified requirements for content and format. On one hand, scientific journals need to further process and transform more forms of dissemination works based on papers, such as adding video abstracts, producing short content videos, and recording interviews with authors about their research processes and stories. Production formats are shifting from text-graphic to audio-visual eras. For example, *Journal of Visualized Experiments*, *Video Journal of Education and Pedagogy*, and *Chinese Journal of Cardiology (Online Edition)* have launched video-based scientific content publication formats, facilitating broader audience communication and interactive understanding through richer work styles. On the other hand, scientific journals need to expand communication channels beyond periodicals, integrating journals, forums, short videos, documentaries, television programs, and other channels in line with converged media development trends to build all-media scientific knowledge production and transformation matrix platforms. Simultaneously, multiple scientific

journals should be aggregated to develop digital research data sharing and exchange platforms through cluster development, constructing cluster-based, networked, and converged media knowledge transformation channels.

Fourth, strengthening comprehensive, full-process, and multi-level value-added services tailored to different knowledge actors' needs. Under open science, scientific research is no longer a "mysterious," "profound," and "closed" activity of traditional academic communities but a scientific public undertaking belonging to the entire society. Simultaneously, scientific journals are no longer "cold and aloof" but provide linking and information services for various knowledge actors in knowledge production networks. Especially empowered by digital technology, scientific journals can provide more precise and intelligent solutions and value-added services for different knowledge actors, truly achieving user-centered precise matching. For research institutions and researchers, scientific journals are not only platforms for research output release but also consulting service institutions participating throughout the entire process of topic selection, project initiation, paper revision, and research review—essentially capable intelligent research assistants. Moreover, for other diversified knowledge actors including technology enterprises, technology groups, government departments, social organizations, and the public, scientific journals can similarly leverage digital technology systems and artificial intelligence tools to integrate rich academic resources and research data, providing specific research information consultation and problem solutions. Thus, the service structure, content, quality, process, and business of scientific journals can be comprehensively optimized and innovated.

Fifth, promoting collaborative knowledge innovation and cooperation among multiple actors through problem orientation. Under open science, new scientific knowledge and research achievements should not be confined within traditional academic communities but should break knowledge transformation and dissemination barriers, strengthen knowledge sharing, and enable more non-professionals to participate in the entire research process, establishing cooperative relationships among different knowledge actors. This not only strengthens knowledge supply-demand complementarity and interactive exchange among different actors but also facilitates timely feedback of research dynamic information, effectively improving scientific knowledge production and transformation efficiency. Since scientific research involves substantial tacit and professional knowledge accumulation, the effective operation of scientific knowledge production and transformation network systems depends on whether scientific journals can effectively transform interactive languages and interest demands among different knowledge actors. By focusing on specific problems, aggregating and integrating interest claims and research resources among different actors, building timely and effective information release and feedback systems that integrate data collection, processing, distribution, and application, knowledge aggregation and transformation effects can be generated. Embedding the scientific knowledge innovation chain within the knowledge transformation value chain can enhance knowledge collaboration and research cooperation among different

actors. Thus, under open science, the boundaries of knowledge transformation in scientific journals become more blurred, emphasizing open sharing of scientific knowledge and participation of the entire society, with collaborative cooperation among various knowledge actors becoming increasingly frequent and close.

In the open science era, scientific knowledge production and transformation networks have broken through traditional academic community boundaries, transforming knowledge production modes and research paradigms and making open access, sharing, and participation possible for scientific knowledge, research data, and research processes. Within this context, scientific journals occupy increasingly important linking and bridging positions and play crucial collaborative organizational roles. This study has analyzed traditional knowledge transformation pathways and their deficiencies, examined the positioning and functional transformation of scientific journal knowledge transformation under open science, and proposed innovative strategies for further promoting knowledge transformation pathways based on comparative analysis.

This study primarily discusses the functional positioning and pathways of scientific journal knowledge transformation under open science from a theoretical perspective, lacking empirical research with specific journal data. Future research will continue to focus on the major transformations and impacts of open science on scientific journals, track reform and development trends, and further investigate functional reorganization and pathway innovation in typical scientific journals.

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