Research on Knowledge Translation Pathways of Scientific Journals in the Context of Open Science: Postprint

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Abstract

[Objective] To investigate the functional positioning of scientific journals within the conceptual and policy framework of open science, fully activate and leverage their positive role in the knowledge production network, and innovate pathways for knowledge transformation and application. [Method] Through text analysis, case studies, and logical argumentation, this study conducts a comparative analysis of knowledge transformation pathways between scientific journals in the open science context and traditional scientific journals, distilling and summarizing innovative strategies for knowledge transformation pathways. [Results] Centered on diverse stakeholders including researchers, academic institutions, government, and the public, this paper proposes diversified knowledge transformation pathways and an integrated cluster development model for scientific journals. [Conclusion] Under the open science perspective, scientific journals occupy a linking actor position within the knowledge production network, serve a bridging function, and through active transformation and innovation of knowledge transformation pathways, can enhance the efficiency and quality of knowledge transformation.

Full Text

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

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Abstract

[**Purpose**] This study explores the functional positioning of scientific journals under the concept and policy framework of open science, aiming to fully mobilize and leverage their active role within knowledge production networks and to innovate their knowledge transformation and application pathways. [**Methods**] Through textual analysis, case studies, and logical demonstration, we conduct a comparative study between knowledge transformation pathways of scientific journals in the open science era and those of traditional journals, extracting and summarizing innovative strategies for knowledge transformation. [**Results**] Centering on different stakeholders including researchers, academic institutions, government, and the public, we propose diversified knowledge transformation pathways and integrated cluster development models for scientific journals. [**Conclusion**] From the perspective of open science, scientific journals serve as linking actors within 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 networks; 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 the storage and retrieval of scientific knowledge and related information more convenient.

The concept of open science, formally proposed after developmental stages of open access and open data, has received 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 new direction and trend in the evolution of contemporary scientific knowledge production and transformation networks [1].

In the era of big science, research demonstrates a trend toward open cooperation and sharing both horizontally through interdisciplinary integration and vertically through deep fusion of science, technology, engineering, and industry. Against this backdrop, 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 ex-

perimental processes and scenarios, expanding from research outputs to research data and further to the entire process and lifecycle 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 outcomes related to scientific research through the joint participation of all stakeholder actors. Its objective is to make scientific research resources and information more easily accessible, knowledge works more readily available, research processes more transparent, and scientific knowledge production and transformation more efficient and effective [3]. In recent years, domestic and international scholars have increasingly focused on open science research, primarily examining its 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 argues that open science represents 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 outcomes but also to all information and data related to knowledge. In terms of process, open science encompasses not only open review and open publishing of knowledge outcomes 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 higher form of scientific knowledge production and transformation in the digital age.

Within this context, the role and position of scientific journals in scientific knowledge production and transformation networks have changed significantly. Under the open science perspective, traditional knowledge transformation pathways of scientific journals can no longer meet the communication needs among different actors in scientific knowledge networks. The network 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 interaction efficiency within 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," better facilitating the full flow of knowledge streams and collabo-

rative 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. By the early 19th century, marked by the establishment of the University of Berlin, knowledge production formally entered the "academic science" stage. Since the mid-to-late 20th century, knowledge production has gradually deviated from the traditional "ideal" state toward "post-academic science," representing an extension of academic science into industrial domains. Operating under market organizational principles within an "application context," this "mode of knowledge production" pursues the commercial value and market application of knowledge, 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 under multi-actor participation, thereby achieving multi-sector collaborative knowledge production [15]. The network characteristic of scientific knowledge production has become a prominent feature.

Research on knowledge transformation has primarily focused on knowledge transfer and diffusion from developed to developing countries, with relatively few studies specifically examining knowledge transformation within knowledge production systems. It is often encompassed within general research on knowledge production modes. Since this study highlights the positioning and functions of scientific journals in knowledge transformation corresponding to knowledge production by research institutions, knowledge application and development by technology enterprises, and public understanding of science, the concept of "knowledge transformation" is specifically extracted from general knowledge production research. The focus is on how scientific journals can better serve research institutions' knowledge production and innovate knowledge transformation pathways for technology enterprises and public participation in science under the open science context. Therefore, knowledge transformation in this study refers to the processing and re-creation of discovered and validated scientific knowledge into various forms of knowledge outcomes, a concept that parallels and corresponds to knowledge production and knowledge application.

1.2 Research Methods

This paper employs textual analysis, case studies, and logical demonstration as primary methods to conduct comparative research between knowledge transformation pathways of scientific journals under open science and traditional pathways, extracting innovative strategies for knowledge transformation. First, textual interpretation and analysis are used 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. Literature on the functional positioning and business operations of scientific journals is reviewed to analyze current development lag phenomena and their causes. Selected scientific journals serve as case studies to identify deficiencies in current knowledge transformation pathways under open science and explore functional transformations of scientific journals. Finally, through logical demonstration and based on the special position and important functional transformations of scientific journals under open science, the paper attempts to propose innovative strategies and development measures for knowledge transformation pathways.

2 Traditional Knowledge Transformation Pathways of Scientific Journals and Their Deficiencies

With a history spanning several centuries, traditional knowledge transformation pathways of scientific journals have centered primarily on the publication of scientific papers, with clear positioning and functions within conventional academic communities. Macroscopically, traditional pathways link knowledge production and application, encompassing the recording, collection, review, publication, and dissemination of scientific discoveries and research outcomes. They constitute an important link in knowledge production systems and serve national scientific research development, technological economic growth, and international academic discourse power building. Microscopically, traditional pathways serve researchers' presentation of achievements and demonstration of capabilities, as well as research institutions' disciplinary development and research dynamics, functioning as important channels for scientific knowledge exchange and communication and as carriers for research outcome storage. Simultaneously, traditional pathways reflect the important goal of scientific journal management departments and publishing units providing 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 [Figure 1: see original paper].

The first characteristic is the centrality of scientific paper publication. Traditional 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, documentary materials for research work, and communication carriers for academic communities. Since the 20th century, electronic information technology has enabled the development of electronic journals, paper databases, and literature collection and search systems, 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 and literature analysis, leaving their service functions unenhanced. Traditional pathways focus on providing researchers with important carriers for publishing achievements and accessing literature, offering review, evaluation, recognition, and dissemination services for research outcomes. Published papers become researchers' "achievement passports" within academic communities. Consequently, traditional pathways are content-dominated routes centered on scientific papers, with serious insufficient attention and development devoted to secondary transformation of scientific knowledge and other related information. Recognition of value-added services remains noticeably inadequate, with service content and scope requiring further expansion.

The second characteristic is the predominance of linear knowledge transformation paths. Traditional pathways focus on paper editing and publication, following a single route of "author—editor—reader," with the entire process presenting a linear, one-way, closed state. Researchers (authors) submit manuscripts to journals (editors), who then distribute edited papers to other researchers (readers). Knowledge transformation paths emphasize editing and distribution. On one hand, the phenomenon of "heavy front end, light back end" is evident, with excessive investment in manuscript solicitation, review, editing, publication, and distribution, but insufficient investment in further transformation, development, and dissemination after publication. On the other hand, "reverse services" for researchers are seriously inadequate. Traditional pathways fail to provide reverse or backward research support services for researchers, such as timely and dynamic feedback of effective data and information on research topic selection, research trends, and literature analysis. Under such traditional pathways, scientific journals have not only failed to establish dissemination channels with the broad public but have also not built efficient two-way interaction channels with researchers. Information exchange and interaction among various knowledge actors remain untimely and unsmooth, with limited imagination for diversified transformation and multi-directional flow of scientific knowledge.

The third characteristic is conformity to traditional academic community order. Scientific journals are formal platforms that gather new scientific discoveries, knowledge, and achievements, serving as important venues for intellectual collision, academic interaction, research services, and knowledge dissemination. With the rapid development of scientific research, scientific journals have become systematic, large-scale, and standardized. However, traditional service targets have not expanded to the broader social whole, and journals have not assumed the "structural hole" function in knowledge production network systems or played linking and bridging roles. Under traditional pathways, scientific journals occupy a subordinate position within the autonomous state of traditional academic communities. First, journal review and publication opinions primarily come from traditional academic community peer review, with journals' own 审核 opinions and decision-making weight being relatively small. Second, service targets remain mainly within traditional academic community boundaries, excluding broader knowledge actors such as technology enterprises, government

departments, and the public. Third, scientific journals only undertake editing, review, and paper publication work 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 to provide problem-solving solutions for knowledge actors. The era of scientific journals focusing solely on scientific paper editing and publication is ending, while an era centered on providing customized and extended services for scholars, industries, and society has arrived [16]. Under the open science perspective, the knowledge transformation functions of scientific journals have undergone significant changes.

3 Functional Transformation of Scientific Journals' Knowledge Transformation 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. Centering on knowledge transformation, scientific journals engage in highly specialized, in-depth, and dynamic tracking of scientific frontiers and direction guidance through review of knowledge production outcomes, guidance and orientation of knowledge production directions, summarization and refinement of new knowledge, and knowledge correlation and recombination among different knowledge types. 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 within knowledge network systems. 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 functions of scientific journals represent a comprehensive summary of their roles in content, data information, application services, and decision guidance throughout the entire process from new knowledge production to application. The functional transformation is mainly manifested

in six aspects: knowledge production service and guidance, knowledge application service and promotion, knowledge integration and evaluation, knowledge dissemination and diffusion, overall knowledge network guidance and maintenance, and collaborative knowledge innovation and cooperation [Figure 2: see original paper].

First is 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, when reviewing and editing papers on new knowledge, journals engage in textual rhetoric and processing, which itself constitutes a knowledge production service. On the other hand, as journal staff naturally position themselves at the forefront of academic trends during publication, scientific journals can often provide research institutions and researchers with services on new research trends and topic selection. Scientific journals maintain close contact with academic communities, deeply participate in scientific knowledge production practices, and possess obvious advantages in guiding research trends and directions. However, current knowledge production service and guidance functions of Chinese scientific journals remain insufficient, with relatively weak cultivation and incubation services around research project selection and manuscript organization.

Second is knowledge application service and promotion for technology enterprises. A major 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 scientific principle discovery of transistors has driven the high-speed development of the entire semiconductor technology and electronic information industry. Research oriented toward industry is increasingly becoming the mainstream trend. 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 is knowledge integration and evaluation of various scientific and technological achievements. As scientific research deepens, knowledge production processes exhibit obvious domain subdivision trends, with increasingly specialized content and more focused target problems. Simultaneously, integration and consolidation are needed upon this foundation, leading many new discoveries and fields to present interdisciplinary and cross-integration characteristics. Consequently, the value of scientific journals in gathering, integrating, analyzing, comparing, and presenting various new knowledge has become increasingly prominent. The knowledge integration and aggregation effects of scientific journals have received widespread attention from academic and jour-

nal circles. Therefore, cluster development of scientific journals has become one of the hot topics in current scientific journal research, as it helps further enhance the knowledge transformation functions of scientific journals within knowledge network systems.

Fourth is knowledge dissemination and diffusion for the public. Previously, knowledge dissemination and academic exchange of scientific journals were locked within academic communities. Knowledge dissemination based on scientific papers and academic conferences was considered a special function for researchers, with clear object scope and boundaries. Paper publication and subscription within academic communities were regarded as the most basic functional attributes of scientific journals. However, with the continuous development of public participation in science concepts and movements, as well as improved higher education enrollment rates and public scientific literacy, more people can understand scientific papers. Although not members of academic communities engaged in scientific research, more individuals have formed or are forming habits of reading and organizing scientific papers and information due to various needs related to work or physical and mental health. From the perspective of knowledge dissemination objects, the targets of scientific journals' knowledge dissemination and diffusion are expanding from academic communities to the broader public. Knowledge dissemination and diffusion for the entire society have become new indicators for evaluating the influence of scientific journals.

Fifth is overall guidance and order maintenance of knowledge production network systems. Due to the professionalism of scientific research and the complexity of knowledge production networks, it is difficult for government departments or technology enterprises to completely dominate the entire knowledge production and transformation network system. Particularly, basic exploratory research in scientific research has high uncertainty, which differs significantly from technology development and engineering projects. Consequently, academic community autonomy has been proposed as a relatively feasible solution. However, as scientific knowledge dissemination and exchange have expanded beyond academic community boundaries, relying solely on academic communities has become insufficient to maintain the entire knowledge network system. The natural linking bridge among research institutions, technology enterprises, government departments, and the public is scientific journals. Thus, guiding and maintaining the overall order of scientific knowledge production network systems has become a new function of scientific journals.

Sixth is 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 empowered by digital technology, knowledge production factors, data, outcomes, application demands, and dissemination information flow and configure innovatively among different knowledge actors at faster rates and

higher quality, improving knowledge production and transformation efficiency, drastically shortening cycles, and making efficient collaboration among different knowledge actors possible. In such a cyclic network system of knowledge production, transformation, application, and reproduction, scientific journals face not only authors and readers of scientific papers but all relevant actors in knowledge network systems. Collaboration among different actors involves countless linking points and supply-demand matching needs, positioning scientific journals far beyond editors to become service providers for constructing and maintaining research collaborative relationships. Consequently, 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 of Scientific Journals Under Open Science

Open science concepts and movements represent an inevitable trend driven by the rapid development of digital technology and artificial intelligence technology. Digital technology enables online storage, transmission, download, and real-time interaction of comprehensive, three-dimensional, and multi-dimensional research data and information. Artificial intelligence technology enables timely dynamic search, archival organization, and precise presentation of massive scientific papers and research process data under algorithmic drive. Particularly, the development of generative artificial intelligence technology has exerted disruptive and revolutionary impacts on knowledge production modes and research paradigms. Open science aims to break through the subject boundaries of traditional academic communities, presenting the entire process and complete information of scientific research 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 been highlighted and strengthened, and nonlinear networked interaction and collaborative cooperation among knowledge actors have been enhanced. Consequently, innovation strategies for knowledge transformation pathways of scientific journals under open science are mainly manifested in five aspects [Figure 3: see original paper].

The first strategy is constructing new academic communities. Scientific journals should effectively utilize new technological tools to expand academic community boundaries from researchers and research institutions to broader technology enterprises, scientific groups, government departments, social organizations, and the public—diverse knowledge actors. Using research data, scientific papers, and experimental process information as basic bonds, journals should form maximally heterogeneous knowledge production network ecosystems and construct new academic communities. Adapting to 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. This promotes innovative flow and configuration of scientific papers and research data, strengthens knowledge correlation, and deeply mines the potential value of research data. On one hand, this changes the traditional subordinate position to academic communities, rerecognizing the positioning and functions of scientific journals within new academic communities and continuously strengthening their organizational and cohesive roles. On the other hand, it changes traditional business scopes, rerecognizing the value and roles of scientific journals in new academic communities through business approaches such as research trend analysis, trajectory tracking, and topic selection, continuously exploring frontier research fields and organizing joint research positions, thereby leading the development of new academic communities and promoting higher efficiency and quality in research development.

The second strategy is 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 changed the traditional linear relationship of unidirectional submission from research institutions to journals. Instead, scientific journals, with their keen insight into academic dynamics and capabilities in topic planning and manuscript organization, organize joint research across subject boundaries, 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. The interactive issues between research institutions and the public require effective knowledge transformation by scientific journals, which serve both as intermediary links and as organizers hosting activities. Third, as scientific journals occupy the structural center of new academic communities, playing central linking and outward radiating roles in research agenda setting and paper review, they should strengthen research data and paper recording, archiving, and display while further enhancing their leading roles in problem identification, project planning, research organization, interaction promotion, and innovation development in research. The work of scientific journals is both the tail and the head of the dragon.

The third strategy is forming journal clusters and communication matrices for multi-channel, multi-format knowledge transformation, processing, and production. Under open science, knowledge transformation content of scientific journals includes not only scientific paper publication but also richer content such as experimental data, notes, scenarios, and achievement introductions, imposing diversified requirements on content and form. On one hand, scientific jour-

nals need to further process and transform more forms of dissemination works based on scientific papers, such as adding video abstracts, producing content shorts, and recording author research process and story interviews. Production forms are shifting from graphic eras 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 forms, using richer work styles to facilitate dissemination and interactive understanding among broader audiences. On the other hand, scientific journals need to further expand communication channels beyond journals themselves, adapting to converged media development trends by integrating journals, forums, short videos, documentaries, television programs, and other channels to build all-media scientific knowledge production and transformation matrix platforms. Simultaneously, multiple scientific journals should be aggregated for cluster development of digital research data sharing and research exchange interaction platforms, constructing cluster-based, networked, and converged media knowledge transformation channels.

The fourth strategy is 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 publishing research outcomes but also consulting service institutions participating throughout the entire process of research topic selection, project initiation, paper revision and polishing, and research review—capable intelligent research assistants. Moreover, for other diverse knowledge actors including technology enterprises, scientific groups, government departments, social organizations, and the public, scientific journals can similarly integrate their rich academic resources and research data through digital technology systems and artificial intelligence tools to provide 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.

The fifth strategy is problem-oriented promotion of collaborative knowledge innovation and cooperation among multiple actors. 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 with mutual benefits among different knowledge actors. This not only strengthens knowledge supply-demand complementarity and interac-

tive 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. If problem-oriented approaches gather and integrate interest claims and research resources among different actors, build timely and effective information release and feedback systems integrating data collection, processing, distribution, and application, and generate knowledge aggregation and transformation effects by embedding the scientific knowledge innovation chain and knowledge transformation value chain, collaborative knowledge innovation and research cooperation among different actors can be enhanced. Thus, driven by open science concepts, the boundaries of knowledge transformation for 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.

5 Conclusion

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

This study primarily discusses the functional positioning and transformation pathways of scientific journals under open science from a theoretical demonstration perspective, lacking empirical research with specific journal data. In the future, the authors will continue to pay attention to the major changes and impacts of open science on scientific journals, continuously track the reform and development trends of scientific journals, 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.