# Analysis of Knowledge Service Models for Scientific Journals in the Post-Pandemic Era: Postprint

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## Abstract

The development framework for knowledge services represents an inevitable choice and inherent requirement for integrated publishing development, serving as an innovative approach and important pathway for resource development and utilization in the publishing industry. Based on the origins of knowledge services and commencing with an analysis of the pandemic' s impact on audiences, this paper explores the necessity and implementation pathways for scientific journals to develop knowledge service models in the post-pandemic era, and proposes a basic architecture for scientific journals to launch knowledge services grounded in media convergence.

## Full Text

### Knowledge Service Models for Scientific Journals in the Post-Pandemic Era

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**Abstract:** The development pattern of knowledge services represents an inevitable choice and inherent requirement for the integrated development of publishing, serving as an innovative approach and important pathway for resource development and utilization in the publishing industry. Based on the origins of knowledge services and analyzing the pandemic' s impact on audiences, this paper explores the necessity and implementation pathways for scientific journals to develop knowledge service models in the post-pandemic era, proposing a basic framework for scientific journals to conduct knowledge services through media convergence.

**Keywords:** digital reading; scientific journals; digital publishing; knowledge services; pandemic; national reading

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According to data from the *15th National Reading Survey*, driven by the popularization of smart terminals, the digital reading engagement rate among Chinese adults has maintained continuous growth over the past decade, reaching 80.0% by the end of 2019 [1]. More than half of adult citizens now prefer digital reading, making it the mainstream trend. The outbreak of COVID-19 has dramatically transformed traditional newspaper and journal subscription and delivery methods, particularly during peak pandemic periods when government advocacy for contactless delivery further accelerated the cultivation of digital reading habits among users [2]. This shift in national reading habits has propelled the entire book and journal market toward online, digital, and intelligent transformation, establishing digital reading as the dominant mode.

Simultaneously, the widespread adoption of smart terminals has not only changed how users read but also narrowed the relationship and distance between media and users, shifting user behavior from obtaining mass information to acquiring personalized information. The demand for customized information has become a primary characteristic distinguishing audiences from media. The pandemic has acted as a catalyst for a series of online businesses [3] and accelerated the digitalization process of scientific journals. At the same time, various pressures have forced journals to expedite their exploration of knowledge services. Most editorial departments quickly switched to online office modes during the pandemic, utilizing internet thinking to conduct live conferences and thematic forums, implementing online manuscript solicitation, commissioning, typesetting, and distribution, thereby achieving cloud-based meetings, cloud typesetting, and cloud publishing. This enabled pandemic-related research findings to be published in a scientific, rigorous, and professional manner in the shortest possible time. During the pandemic, we have deeply recognized the advantages of digital publishing, and future online publishing models will undoubtedly become the mainstream development pattern for the journal industry. Therefore, constructing a content production and dissemination model that combines online and offline approaches has become the primary direction for future transformation and upgrading of the journal industry. The pandemic has also brought new challenges to knowledge service development in scientific journals, while simultaneously revealing new demands and characteristics of knowledge services during this special period. Under these circumstances, adjusting knowledge service strategies for scientific journals and establishing a knowledge service system that meets post-pandemic era requirements is particularly crucial.

## 1. The Necessity and Existing Problems of Knowledge Services in Scientific Journals

As platforms for academic exchange and scientific achievement display, scientific journals shoulder significant social responsibilities that cannot be underestimated. While traditional scientific journals' core advantage lies in content resources, they also face barriers with audiences due to their professional nature, limited dissemination scope due to fixed readership, and communication obstacles arising from technology, carriers, and channels [5]. The professionalism of scientific journals may seem somewhat "intimidating" to the general public, yet the public' s demand for scientific knowledge has always existed. Research by scientific journals on social hotspots, economic, and scientific issues is recognized by the public for its authority and cutting-edge nature [6]. Currently, scientific journals face numerous problems in knowledge dissemination. Under the impact of massive internet information, scientific journals struggle with popularizing research findings due to their small audience and low circulation. However, precisely because of their professionalism and authority, their content becomes a special need for certain audiences.

Based on this, an increasing number of journal practitioners have begun exploring diversified knowledge service pathways for scientific journals. Ren Yanqing first proposed the concept of a scientific journal knowledge service system and introduced its service objects, functional modules, and application value [7]. Existing discussions on knowledge services in scientific journals include: Chen Jianhua provided definitions and characteristics of scientific journal knowledge services and explored innovative pathways in carriers, methods, and service models [8]; Yu Qing conducted explorations and practices using individual journals as case studies, analyzing the need to clarify user classification and knowledge requirements for scientific journals to develop knowledge services, exploring main channels for hierarchical, classified, directional diffusion and precise push, as well as methods for integrating knowledge services into key research stages [9]; Wang Yan explored knowledge service models and strategies for academic journals based on mobile applications [10]; Shen Xibin discussed service models for scientific journals in digital environments and summarized the current research status of knowledge services in Chinese scientific journals through literature review, interviews, and experience review, mapping knowledge service mind maps and resource distribution and feasibility analysis scales [11].

These studies have explored transformation development models and pathways for scientific journal knowledge services through open service analysis, explored knowledge service approaches by disseminating existing content resources through proprietary websites, proposed integrated knowledge service methods through classified directional diffusion and precise push, and expanded the scope of scientific journal knowledge services through enhanced publishing via WeChat official accounts. The research findings provide certain reference value for 开拓 knowledge service applications in scientific journals. However, problems remain in the transformation of knowledge services in scientific

journals. WeChat official account communication is still at a low-end stage; scientific journals are highly professional with numerous charts, resulting in a low proportion of full-text publication; some scientific journals have attempted secondary dissemination of articles through forms like Ebook and FLbook in new media communication modes, but these have not yet become popular due to copyright issues. During the pandemic, changes in reading habits among scientific journal audiences, coupled with authoritative content becoming a special need for audiences and limitations in publishing workflows, have led to ineffective implementation of offline business and dissemination. Therefore, scientific journals urgently need to expand dissemination pathways, optimize publishing workflows, and transform service concepts to adapt to dissemination development needs in the post-pandemic era.

## 2. Approaches for Scientific Journals to Develop Knowledge Services Based on Media Convergence

In 2020, the COVID-19 pandemic triggered changes in a series of social operation models and brought tremendous impact to the journal publishing industry. Traditional offline journal operation models, content creation, dissemination and management, production printing, and publishing distribution all suffered heavy blows. During the pandemic, many booksellers and publishers were forced to close; scientific journal exhibitions had to be postponed or canceled; editorial staff' s offline business training and exchange cooperation were also constrained; most journals had to suspend or delay publication due to limitations in traditional editorial workflows and printing business restrictions; articles requiring experimental support could not be followed up in a timely manner. These problems have, to some extent, led to manuscript shortages in scientific journals, subsequently affecting publication schedules.

Behind the pandemic' s explicit impacts, the traditional journal industry has been undergoing continuous changes, with the pandemic merely accelerating the process of journal knowledge services. Faced with the crisis, the journal industry needs to turn "danger" into "opportunity" and transform its operational philosophy. By integrating digital dissemination concepts and embracing the arrival of the big data era, journal dissemination methods and effects can become more efficient and precise; by adhering to the "content is king, quality first" philosophy and increasing high-quality content output, journals can fully leverage traditional professional editorial advantages and content resource strengths to deliver high-quality output across multiple stages including planning and acquisition, editing and publishing, and dissemination and promotion.

### 2.1 Integrating Digital Resources to Improve Resource Utilization

Authoritative, high-quality content resources have always been fundamental to the development of scientific journals. To further enhance core competitiveness, journal publishers need to innovate dissemination content, actively participate

in digital publishing practices, and provide readers with comprehensive and three-dimensional services. By utilizing digital platforms and formats, professional scientific information can be converted into various reading forms through high informatization of content resources, thereby improving the dissemination speed and efficiency of cutting-edge disciplinary information and the public utilization degree of scientific research, while associating journal information with public databases to enhance service capabilities. Digital means make back-issue information more searchable, compressible, and easier to operate and link, preserving, indexing, and reselling original journal data. Through various derivative dissemination, mining, and reconstruction methods, the value of horizontal industrial chains can be broadened, achieving a shift from unidirectional to user-oriented dissemination, making original journal data more accessible, useful, and usable [12].

The practice of *Metal Processing* journal provides valuable experience for numerous scientific journals developing knowledge services. The journal possesses a massive digital resource management platform that integrates large amounts of data and content from the publisher' s portal website, providing knowledge services to institutions and researchers according to certain rules. *Metal Processing* has not only promoted the development of metal processing technology at the knowledge level but also improved equipment levels in the metal processing industry, gradually forming a most dynamic, influential, and "golden fan" -trusted all-media content service and promotion platform in the metal processing field, with paper media as the foundation and digital media as the leading force, integrating paper media, web media, and social media. The journal has also seized opportunities to meet the needs of the times for digital transformation and upgrading, expanding its influence through platforms like Toutiao, WeChat, and Weibo, creating journal accounts on Toutiao, WeChat official accounts, and Weibo that have reached 1.5 million followers, making it highly influential in the digital publishing industry and among digital journal enterprises. *Metal Processing* has opened its own e-commerce platform, selling metal processing industry-related products such as metal processing products, industry journals and books, and tools and equipment through e-commerce platforms, achieving profitable revenue by leveraging online consumption concepts.

### 2.2 Conducting Popular Science Communication Based on Content Authority and Niche Characteristics

During the rampant pandemic, rumors flew everywhere, with conspiracy theories and biological weapon theories abounding. While countries worldwide were pointing fingers at each other and casting blame on China, the scientific viewpoints of editors-in-chief of authoritative journals such as *Science* and *The Lancet* played an important role in clarifying the truth. This demonstrates the unquestionable authority of scientific journals, as authoritative judgments from medical scientific journals quickly guided public opinion through popular science communication, with easily understandable popular science dissemina-

tion methods playing a vital role during the pandemic. During the pandemic, medical scientific journals were not just about publishing articles but more importantly about promoting effective connections between research and popular science to develop knowledge services, making the latest research findings accessible to the public through popular science methods. It can be said that the digital dissemination of scientific journals has provided conditions for the personalization and interactivity of knowledge services, making it possible for scientific journal knowledge dissemination to shift from niche to mass audiences.

Meanwhile, some journal websites have opened distinctive personalized services such as data sharing, linking simultaneously with paper publications, web pages, WeChat official accounts, and even individual journal apps to achieve multi-terminal reach, enabling users to quickly search for needed information in massive data. Some journals have established effective links between renowned scholars, authors, and industry influencers, utilizing the interactivity and aggregation of digitalization to achieve in-depth development of journal content, establish multiple business formats, and provide intelligent services to users through new digital means such as online-offline interaction and real-time reporting. For example, the *Journal of Nanjing Forestry University*, focusing on forestry research, extracts articles and then forms popular science questions in accessible language as an introduction, attracting readers with a compelling approach. Meanwhile, it refines and abridges professional articles, finally disseminating professional knowledge in a popular science format through official accounts with authors' voice explanations supplemented by graphics, making professional research findings easily accessible and understandable to the public.

### 2.3 Using Digital Technology to Promote Intelligent Publishing Processes

During the pandemic, traditional journal workflows for acquisition, editing, printing, and distribution could not meet current needs, prompting some nascent businesses to become rigid demands during the pandemic. The application of digital information technology has greatly shortened journal publication cycles, improved work efficiency, reduced costs, and made processes such as topic selection, manuscript solicitation, editing, and distribution simpler and faster. Editorial work has tended toward journal information planning and management, making the entire production process more precise and efficient, overturning traditional publishing workflows for paper journals. For example, using big data and artificial intelligence technologies to extract data from massive datasets, positioning database themes, and helping editors conduct reasonable topic planning, while utilizing digital information technology to achieve automated editing and proofreading, intelligent printing, and precise distribution. An increasing number of scientific journal editors are using digital technology to analyze user search, browsing, and download data to obtain more intuitive and specific reader information [14]. New-generation digital technology promotes modernization of

publishing processes through artificial intelligence algorithms for semantic text analysis and intelligent search, achieving precise content capture and push. For instance, *Metal Processing*, as a faithful recorder and disseminator of China' s metal processing technology development, provides fast and precise knowledge services and technically and professionally strong articles for many enterprises and readers in the metal processing field. The journal has not only launched an online submission website but also utilized online manuscript solicitation, editing, and proofreading during the pandemic, achieving full-process online office work that facilitates author submissions, improves solicitation efficiency, and accelerates manuscript acceptance and review processes, thereby shortening publication cycles.

### 2.4 Developing Precision Services Based on Changes in Carriers and Channels

With the development of information technology, scientific journals have experienced tremendous changes in communication media, content, forms, and the scale, scope, and speed of users based on journal carriers. These changes, in turn, affect the operation and development of journal digital platforms, creating new supply, demand, and business formats for scientific journals. Digitalization will not only promote diversification of traditional paper journal dissemination carriers but also change future journal publishing methods.

During the pandemic, the online education market experienced explosive growth. Publishing institutions actively expanded channels and sought platform resources, with authoritative and professional content resource advantages fully displayed, providing multiple possibilities for building online platforms for high-quality content. Based on user aggregation established through content generation logic, traditional journals need to adopt digital forms, operate digital carriers, integrate digital operation concepts to break traditional editor-oriented content production rules, conduct topic planning and analysis based on databases and user consumption rules across various channels, formulate content suitable for various channel monetization, achieve content aggregation, and control content copyright. With the arrival of the 5G era, scientific journals can rely on network channels, use electromagnetic media, and employ digital technology for typesetting, compression, and linking in forms independent of paper media, such as audio, video, and images. Through innovative digital forms like EBOOK, FLBOOK, WeChat, and Weibo, original content can be incubated on mobile and PC terminals, integrating multi-form content resources through graphics, audio-video, and communities to achieve multi-dimensional symbiotic development of traffic, content, and platforms, enabling precise information dissemination and transforming mass services into personalized needs.

### 2.5 Deep Mining Publishing Data to Achieve Precise Knowledge Push

**2.5.1 Building Data Mining Systems** The deepening digital transformation of scientific journals, along with the integration of new-generation information and communication technologies such as big data, cloud computing, and blockchain with the publishing industry, has brought about the reconstruction of traditional publishing and dissemination systems. This has formed new publishing business formats characterized by data-driven [15] operations, platform support, value-added services, and intelligent leadership, continuously promoting publishing productivity and providing possibilities for reengineering knowledge service processes in scientific journals. Journals have accumulated rich academic resources and data during their long-term development. Under new-generation information and communication technologies, data has become the core of knowledge services in scientific journals. The interaction between data, algorithms, and scientific journal editors has transformed into "data-driven" operations, turning data into an important asset while also bringing opportunities for journals' own data collection, storage, and management. For example, based on argument matching and big data analysis technologies, calculating statistics on institutions containing similar arguments and related research, citation data of literature, and domestic and foreign journals citing such arguments, then arranging TOP institutions, journals, and target group selections in 图谱 and list forms to fully mine the value of data resources and achieve data resource integration and sharing, data labeling, data cleaning, intelligent collaborative training, and structured storage—these will become issues that future professional knowledge services need to consider.

Mining usable data from massive, multi-channel, and multi-type data can not only provide academic support for researchers but also create unique value for users. In the future, scientific journals need to break traditional decentralized dissemination patterns and play a "facilitating" role through data mining in the "author-journal-reader" triangular cycle to conduct deeper research, enabling papers to achieve greater dissemination value and better serve society and the general public.

**2.5.2 Improving User Management Systems** Users are both producers and creators of content. Alongside changes in reading habits, needs, and behaviors, major traditional and new publishers are competing to explore digital publishing content [16]. In the process of integrated development between traditional and emerging publishing, content competition will play the most fundamental role. This also means that whoever can better develop and integrate content resources, cater to users' changing reading habits, and meet modern users' reading needs will occupy the commanding heights in future publishing competition. Therefore, in the big data era, there is an urgent need to build a comprehensive user labeling system, deeply mine user needs for refined content services, and thereby implement refined user lifecycle management to satisfy personalized reading needs [17]. In the future, precise dissemination of journals

will also rely on support from professional data companies, with collaborative cooperation gradually becoming a trend. Through precise dissemination systems within big data frameworks, scientific journals can screen target customers based on their niche dissemination characteristics while focusing on cultivating potential authors, mining new authors, ensuring content output, establishing author resource databases, and providing strong author team guarantees for the development of scientific journals.

The continuation of the pandemic has made scientific journal practitioners deeply recognize the necessity of developing knowledge services. On one hand, scientific journals need to build an operational system with content creativity as the core, big data technology as the driver, and multi-channel platforms as the support, prioritizing user services as the primary task. They must transform and upgrade toward "modern journals" to achieve high-quality, digital, and academic development, creating resonance between journal development concepts and user needs, truly driving the knowledge service functions of scientific journals, and continuously enhancing their dissemination power and knowledge service capabilities. On the other hand, accelerating digital transformation and upgrading and knowledge service models can not only compensate for lagging responses but also maximize scholars' enthusiasm, attract the return of high-quality manuscripts, enable first-class scientific journals to continuously accumulate new knowledge and data, gradually catch up with international standards, improve the competitiveness of Chinese scientific journals, control discourse power in scientific fields, and provide "Chinese experience" for global pandemic response [16].

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