Scientific Journals in the Digital Publishing Era: Challenges and Countermeasures Postprint

Authors: Chen Wenjing

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Abstract

At present, Chinese scientific journals are in a critical period of development opportunity. The state has promulgated a series of supportive policies to encourage their development. However, at a time when digital publishing has become the primary mode of publishing and dissemination for scientific journals, they are confronted with unprecedented challenges. Through analyzing the challenges encountered by scientific journals and addressing the problems they face, this article proposes development countermeasures for the digital publishing era from four dimensions: transforming publishing philosophy, improving dissemination methods, enhancing academic influence, and expanding profit channels.

Full Text

Scientific Journals in the Digital Publishing Era: Challenges and Strategies

Abstract

China currently stands at a critical juncture of development opportunities for scientific journals, with the state introducing a series of supportive policies to encourage their growth. However, as digital publishing has become the primary mode of publication and dissemination for scientific journals, these journals are encountering unprecedented challenges. By analyzing these challenges and the problems they face, this article proposes development strategies for scientific journals in the digital publishing era from four perspectives: transforming publication philosophy, improving dissemination methods, enhancing academic influence, and broadening profit channels.

Keywords: Scientific journals; digital publishing; challenges; strategies

Author: Chen Wenjing

Introduction

Over the four decades since China' s reform and opening up, the country' s scientific journals have experienced rapid growth in numbers. By the end of 2016, China had 5,020 scientific journals, forming a development pattern with comprehensive disciplinary coverage and steadily improving academic standards. These journals have played a vital role in promoting the transformation of scientific achievements, driving innovation-led development, expanding international exchanges, and exerting academic leadership [1]. In November 2018, the fifth meeting of the Central Committee for Comprehensively Deepening Reform adopted the "Opinions on Deepening Reform to Cultivate World-Class Scientific Journals," emphasizing the goal of building world-class scientific journals and strengthening publishing work to provide richer and higher-quality publishing products and services to the people. Currently, Chinese scientific journals are at a crucial period of development opportunities.

However, the development of emerging information technologies such as mobile internet and cloud computing has brought unprecedented challenges to traditional publishing. The digital revolution in reading has not only transformed people' s reading habits and thinking patterns but also fundamentally changed how knowledge is acquired and disseminated. An increasing number of scientific journal readers now prefer to obtain cutting-edge scientific information and conduct academic exchanges more conveniently through online platforms, shaking the established position of scientific journals. Although scientific journals have made considerable efforts in digital publishing, they still show signs of weak growth and unsustainable development. This article aims to analyze the development dilemmas facing scientific journals and provide conceptual references for their development in the digital publishing era.

1. Challenges Facing Scientific Journals

1.1 Outdated Publication Philosophy

Compared with the rapid development of emerging media, scientific journals lag far behind in digital publishing, both in platform construction and content arrangement. According to surveys of current digital dissemination methods among scientific journals, the primary modes include self-built websites, WeChat official accounts, and cooperation with third-party publishing platforms such as CNKI and Wanfang. By the end of 2017, while 91.09% of scientific journals had self-built websites and 70.41% had established WeChat official accounts, only 4.56% had developed their own mobile applications, with other convergent media models like VR publishing still in their infancy [3]. Moreover, as the Ministry of Public Security has tightened website regulations, many journals have successively chosen to shut down their self-built websites due to cumbersome content review processes and significant cybersecurity responsibilities. Additionally, content presentation on these platforms is largely limited to print material, with 94.7% being identical to the paper versions [3], making it difficult to leverage

the rich expressive capabilities and flexible linking advantages of online publishing. Although convergent publishing has gained increasing attention from journals, the gap between individual journals and the massive digital resources of third-party platforms like databases makes it challenging to offer more personalized and in-depth services. Furthermore, constrained by the publication cycles of print journals, scientific journals suffer from slow information updates, failing to meet authors' and readers' demands for timely dissemination and unable to effectively capitalize on the advantages of digital publishing, leaving a substantial gap with the requirements of convergent publishing.

Unlike the user-centric thinking of "Internet Plus" enterprises, the publication philosophy of most scientific journals remains focused on "publishing for authors" rather than "publishing for readers," prioritizing upstream content production over downstream content distribution. Since most Chinese scientific journals are academic journals that primarily serve as important carriers for disseminating specialized theoretical knowledge, transmitting scientific and technological information, and conducting scientific evaluation, their starting point tends to center on how to improve academic quality and emphasizes communication with authors while lacking mechanisms for engaging with readers [2]. This prevents journals from making improvements and breakthroughs in catering to readers' needs regarding article type selection, timeliness, publication cycles, and optimized product types and services. Instead, they focus more on providing convenient and efficient submission and review services for authors, such as optimizing peer review and manuscript tracking processes. Article selection is also more influenced by authors'own circumstances, such as whether the research has funding support, the author' s research background, and institutional affiliation. Even in terms of timeliness, journals tend to prioritize convenience for authors by offering expedited publication for professional title evaluations or project completions. This publication approach of "attracting high-quality manuscripts through serving authors" significantly affects content selection, placing scientific journals in a passive position regarding content curation and contradicting the open and interconnected philosophy of the internet. Consequently, despite the maturation of cloud computing technology, only 9.97% of journals utilize big data analytics to analyze and mine reader behavior [3], causing scientific journals to lag behind new media in capturing academic hotspots and tracking cutting-edge disciplinary developments.

1.3 Uneven Journal Quality

The quality of scientific journals in China is uneven. Some low-level, small, scattered, and weak journals, struggling for survival, disregard article quality and have become repositories of substandard papers. In the digital publishing era, however, almost all scientific journal data can be easily retrieved through databases. The presence of these low-quality academic papers in scholarly databases severely undermines the credibility of Chinese scientific journals, making it difficult to gain high international recognition for the overall eval-

uation of Chinese journals and even affecting the brand value of other quality journals and the dissemination of outstanding academic achievements. This situation further exacerbates the outflow of excellent academic papers driven by the research orientation that prioritizes SCI and EI indexing [4]. According to WoS database statistics, between 2007 and 2016, China produced 20,131 highly cited papers (top 1% by citation count), accounting for 14.7% of the world' s share and ranking third globally, indicating that China' s research level has reached a world-leading position [1]. Nevertheless, a large proportion of these outstanding academic achievements were published in international journals rather than domestic ones. The escalating outflow of excellent original scientific and technological achievements has seriously hindered the construction of high-quality journals in China.

1.4 Unclear Profit Model

Currently, most Chinese scientific journals operate under institutional management models of "enterprise-style management of public institutions" or "administrative management of public institutions," relying heavily on government appropriations [1]. These derivative editorial departments lack autonomous operating rights, and editors have weak market awareness and insufficient brand-building concepts and consciousness. Their operational methods and mechanisms are ill-adapted to market-based operations and development patterns. Presently, over 60% of scientific journals primarily depend on funding from their supervising and sponsoring organizations. With postal distribution and self-distribution declining, income from print publishing continues to decrease. Digital publishing of scientific journals is also constrained by third-party platforms like databases, leading to a price-value inversion for digital journals. Statistics from 2016 show that 75.48% of scientific journals had zero annual digital publishing revenue, and in 2017, 82.82% reported no profit from website and new media operations [3]. In some regions, financial audits have questioned the legitimacy of article processing charges, forcing journals to eliminate these fees. Evidently, scientific journals severely lack operational autonomy. Due to unclear profit models, the high investment required for digitalization can only rely on the emphasis and support of sponsoring organizations, thereby hindering the innovation process of digital publishing for scientific journals.

2. Development Strategies for Scientific Journals

2.1 Applying User-Centric Thinking

After a decade of development, scientific journals have invested substantial financial and human resources in digital publishing. However, they still adhere to the conventional mindset of "print journal products as the core" [5], lacking the internet-oriented "user-centric" thinking. Without focusing on readers as the central concern and merely digitizing print journals, digital publishing has yet to become their mainstream business. Therefore, scientific journals urgently need to change their inherent mindset and make "providing services for

readers"the starting point for their digital publishing operations, thereby attracting reader attention among massive literature resources and enhancing journal influence. This requires: (1) Utilizing big data to achieve refined and specialized journal development by mining, screening, and analyzing data on reader search behavior and citation patterns to create reader profiles and commission targeted contributions on hot topics. (2) Enhancing the visibility of journal articles based on reader attention characteristics, including optimizing journal website content construction to provide better service experiences; promoting open access (OA) publishing to improve resource convenience and affordability; strengthening cooperation with digital publishers and evaluation-oriented retrieval databases to increase journal visibility and searchability; and leveraging social media platforms like WeChat official accounts to build and cultivate user communities, improving the effective dissemination of journal content. (3) Developing new product and service content from the reader' s perspective, such as providing knowledge service products that meet readers' needs for digital, fragmented, viewpoint-based, title-based, citation-based, single-article, and literature-tracking reading.

2.2 Improving Dissemination Methods

With the continuous emergence of new technologies, the media ecosystem has undergone earth-shaking changes, with dissemination methods and platforms constantly evolving. Exploring multiple dissemination pathways has become an inevitable choice for scientific journals. Based on current conditions, the main development directions include journal-network integration models, self-media platform publishing models like WeChat, and VR publishing models. However, with the arrival of the 5G era—characterized by high speed, high concurrency, high compatibility, high security, and low latency—more diverse dissemination methods will inevitably emerge, ushering in an age of ubiquitous connectivity and omnipresent media [6]. For scientific journals that started late in new media convergence, competing for discourse power in the future digital publishing era through technological confrontation is clearly unfeasible. Instead, scientific journals should leverage their influence among scientific and technological workers and their content advantages, focusing on implementing personalized professional service functions through independent development and strengthening content service operations to enhance their ability to serve users effectively.

In the digital publishing era, where digital resource capacity serves as a crucial measure of a publisher' s strength, single journals' digital resources simply cannot compete with third-party publishing platforms like databases, which have squeezed out considerable development space and market share. Therefore, expanding development pathways such as cluster-based development models and cross-media integration models can help scientific journals gain discourse power in digital publishing. By building journal clusters, existing journal resources can be integrated to achieve intensive management of editing, publishing, and

operations, effectively expanding the knowledge copyright capacity of journal digital publishing services and enabling journal-centered publishing convergence development. Journal cluster formation is flexible and diverse, including: (1) Professional society journal clusters, where national societies serve as the main publishing body, integrating journals they sponsor and expanding to unite related non-sponsored journals; (2) Network aggregation clusters, where journals with different supervising and sponsoring units gather on a particular network platform; (3) Publisher or journal community clusters, where domestic publishing institutions integrate their subsidiary journals. Through cross-media integration, scientific journals can effectively compensate for their shortcomings in technology and capital, rapidly connecting with new media. Approaches include: (1) Acquisition and merger between different media to form large media groups with integrated property rights, products, and operations, such as the full-media operation model of *Chinese National Geography*; (2) Collaborative integration of resources under the same media group, such as the multi-terminal, multi-angle personalized service model of the *Journal of Zhejiang University (Social Sciences Edition)*; (3) Mergers and acquisitions of traditional media by domestic internet media with strong capital, technology, and user bases, such as the "media empire" led by Alibaba [7]. Although cross-media integration models are difficult to implement, they are inevitable considerations for building world-class journals.

2.3 Enhancing Academic Influence and Brand Building

To enhance academic influence, scientific journals must escape the fate of "traditional media becoming mere content providers for new media" by identifying their precise positioning and striving to build high-quality, specialized journals. Journal refinement involves establishing brand consciousness and constructing premium journals, while specialization requires content segmentation and focused publishing to create distinctive characteristics. Achieving refinement and specialization to boost competitiveness and influence has become a consensus in the journal community, leading China to launch initiatives such as the selection of "Excellent, Outstanding, and Characteristic University Journals in China," the "Chinese Journal Matrix," and the "China Association for Science and Technology Premium Journal Project" [8]. The core issue in building refined and specialized brand journals is highlighting their unique characteristics.

As science becomes increasingly specialized, with interdisciplinary content deepening and sub-disciplines continuously emerging, the trend toward greater specialization and segmentation of scientific journals is irreversible. Leading international publishing groups constantly subdivide their flagship journals into different sub-journals according to specialties and disciplines. However, apart from a few specialized journals, most Chinese scientific journals are comprehensive, pursuing a broad-library publishing mindset with similar directions and content, resulting in homogeneous competition, insufficient influence and brand effect, and gradually becoming mere tools for professional title evaluation.

Moreover, with the continuous development of the internet and the increasing sophistication of journal databases, researchers now primarily rely on database searches to find materials when facing massive amounts of scientific information. This "reading the database" rather than "reading the journal" approach places higher and more specific demands on the professionalism, depth, and uniqueness of journal content for scientific journals to stand out. Some journals overly emphasize impact factors, focusing only on individual article quality while neglecting column planning and characteristic development, lacking holistic thinking about journal development. While this approach may yield short-term quality improvements, it ultimately causes journals to lose their voice amid the vast data resources in databases. Only with clear positioning, professional column planning, and distinctive characteristics can journals achieve sustainable development. For example, *Acta Aeronautica et Astronautica Sinica* positions itself as a platform for disseminating the most cutting-edge scientific and technological achievements in aerospace within China and Chinese-speaking regions, building an integrated academic exchange platform for industry, academia, and research. By creating columns and special issues on forward-looking hotspots and major issues such as large aircraft, hypersonic flow, and aerial guided weapons, it has gained widespread attention, significantly enhanced its influence and credibility in the field, and established authoritative brand recognition [9].

2.4 Broadening Profit Channels

With the continuous development of omnimedia technology in the media convergence environment, some scientific journals have realized that the approach of separating "economic benefits" from "social benefits," neglecting the development of downstream industry chains, and completely transferring the economic value of readership to databases cannot meet the transformation requirements of scientific journals in the new era. Examining profit models for scientific journals both domestically and internationally, they generally include copyright profits, service profits, advertising profits, membership profits, and terminal profits. However, given the large number but small, scattered, and weak nature of Chinese scientific journals, it is relatively difficult to either build proprietary platforms for membership profits through OA publishing or seek copyright profits when competing with third-party publishing platforms. Moreover, most journals do not qualify for advertising profits and lack the capacity for terminal development and operation. Therefore, in light of the rapid development of new media, the author argues that building a journal ecological industry chain through service profits should be the primary direction for broadening revenue streams. Scientific journals should adapt to changing reader habits and meet the needs of young researchers for instant, convenient, and personalized services by accommodating fragmented, viewpoint-based, single-article, and literature-tracking reading preferences. Based on this, they can achieve targeted marketing and traffic monetization through approaches such as data publishing, knowledge services, VR publishing, fragmented publishing, and short-video publishing [10]. However, due to technological backwardness and resource scarcity, breakthroughs

cannot be achieved through the efforts of individual journals alone. In addition to seeking resource integration through cluster-based journal construction, journals can also cooperate with third-party institutions, leveraging their mature service platform technologies, marketing channels, and related resources to advance the transformation from content provision to knowledge services, enrich product forms, and increase value-added profits. Furthermore, support from sponsoring organizations and the state is needed, providing institutional and mechanism guarantees along with financial, technical, and talent support to help scientific journals overcome their difficulties and gradually develop from information services and knowledge services to platform construction, forming a journal ecological industry chain.

Conclusion

Currently, promoting the implementation of the spirit of the 19th Party Congress, earnestly undertaking the unique and irreplaceable mission and responsibility of cultivating socialist core values, driving reform and innovation in scientific and technological development, and enhancing national think tank influence and international impact is paramount for scientific journals. Journal publication should be guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, adhering to the principles of emancipating minds, advancing with the times, maintaining strategic and systematic thinking, and upholding problem-oriented approaches. Journals must proactively recognize, respond to, and seek changes, strengthen strategic planning, identify strategic leverage points, and reshape their operational framework. Against the backdrop of deep integration between traditional and digital publishing, where convergent publishing has become an industry consensus, how to seek new development opportunities and growth points in publication philosophy, dissemination channels, content creation, and profit models deserves deep reflection and exploration by every academic journal practitioner.

Author' s Affiliation: Editorial Office of *Taiwan Agricultural Research*, Institute of Agricultural Economy and Scientific and Technological Information, Fujian Academy of Agricultural Sciences

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References

[1] China Association for Science and Technology. *Blue Book of Chinese Scientific Journals Development (2017)* [M]. Beijing: Science Press, 2017.

[2] Yang Lei. Examining the differences in publication philosophy between domestic and international scientific journals from the perspective of influence gaps [J]. *Publishing Friends*, 2012(5): 73-74, 77.

[3] China Association for Science and Technology. *Blue Book of Chinese Scientific Journals Development (2018)* [M]. Beijing: Science Press, 2018.

[4] Zhao Yan, Zhao Yu, Sui Su. Analysis of development bottlenecks in Chinese scientific journals [J]. *Chinese Journal of Scientific and Technical Periodicals*, 2014, 25(5): 620-622, 627.

[5] Gu Chong. Path selection for traditional publishing houses in the new internet content ecosystem [J]. *Publishing Research*, 2017(12): 39-42.

[6] Yu Guoming. Opportunities and essentials of media development in the 5G era [J]. *News and Writing*, 2019(3): 63-66.

[7] Wang Yanlong, Qiu Zihao. Exploration of scientific journal cluster construction and influence reconstruction [J]. *Chinese Journal of Scientific and Technical Periodicals*, 2017, 28(9): 781-787.

[8] Lü Xiaohong, Yang Kaiying, Miao Yanling, et al. Reflections on brand building of scientific journals [J]. *Acta Editologica*, 2011(S1): 127-129.

[9] Yu Min, Liu Desheng. Research on strategies for enhancing the brand influence of scientific journals in the omnimedia era [J]. *Chinese Journal of Scientific and Technical Periodicals*, 2016, 27(12): 1328-1333.

[10] Liang Saiping. The impact of media convergence development on scientific journal innovation and digital marketing countermeasures [J]. *Acta Editologica*, 2016, 28(4): 320-323.

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