

# Postprint: Research on the Current Status, Problems, and Countermeasures of Technology Convergence in the Publishing Industry Based on Eight Major Technology Areas

**Authors:** Wang Yang, Tang Wenjie, Li Gang

**Date:** 2025-07-09T15:34:24+00:00

## Abstract

**[Purpose]**To review the current status of key technology applications and typical cases in China's publishing industry, providing references for deep technology integration. **[Method]** Focusing on eight categories of technologies including digitalization technology, database technology, new media technology, big data technology, artificial intelligence technology, cloud computing technology, virtual reality technology, and digital copyright protection technology, systematically analyzing their application scenarios and typical cases. **[Results]** China's publishing industry has achieved remarkable progress in technology application, with the eight domain technologies being applied diversely in publishing business and services, continuously driving industry transformation. **[Conclusion]** Revealing issues in current publishing technology integration such as imperfect mechanisms, mismatched operation models, lack of standards and specifications, and talent shortage, and proposing targeted solutions including planning technology application frameworks, increasing R&D investment, improving standard systems, and strengthening talent teams.

## Full Text

### Preamble

#### Research on the Current Status, Problems, and Countermeasures of Technology Integration in the Publishing Industry Based on Eight Major Technology Fields

Wang Yang<sup>1</sup>, Tang Wenjie<sup>2</sup>, Li Gang<sup>3</sup>

(1. China Academy of Press and Publication, Beijing 10000;

2. Jiuzhou Press Co., Ltd., Beijing 10000)

**Abstract:** [Objective] To systematically review the application status and typical cases of key technologies in China's publishing industry, providing references for deep technology integration. [Method] Focusing on eight major technology categories—digital technology, database technology, new media technology, big data technology, artificial intelligence technology, cloud computing technology, virtual reality technology, and digital copyright protection technology—this study systematically analyzes their application scenarios and typical cases. [Results] China's publishing industry has made significant progress in technology application, with diverse application scenarios across the eight technology fields continuously driving industry transformation. [Conclusion] The study reveals existing problems in current publishing technology integration, including imperfect mechanisms, mismatched operation models, and lack of standards and talent, and proposes targeted solutions such as planning technology application frameworks, increasing R&D investment, improving standard systems, and strengthening talent teams.

**Keywords:** publishing integration; technology integration; artificial intelligence; virtual reality; big data

**CLC Number:** G232

**Document Code:** A

**Article ID:** 1671-0134(2025)05-129-05

**DOI:** 10.19483/j.cnki.11-4653/n.2025.05.028

**Citation Format:** Wang Yang, Tang Wenjie, Li Gang. Research on the Current Status, Problems, and Countermeasures of Technology Integration in the Publishing Industry Based on Eight Major Technology Fields[J]. China Media Technology, 2025, 32(5): 129-132, 137.

## Introduction

Currently, digital technologies represented by artificial intelligence and big data are accelerating their iterative upgrades, with continuously increasing industrial penetration, forming relatively mature application paradigms in cultural creativity and digital publishing. In 2023, China's digital publishing industry reached a scale of 1.6 trillion yuan, representing a year-on-year growth of 19.08%—approximately 10 percentage points higher than traditional books, newspapers, and periodicals [1]—demonstrating a significant industrial structure upgrading trend. From a global perspective, the large model market driven by generative AI technology is experiencing explosive growth, showing tremendous application potential across multiple scenarios including images, videos, games, animation, digital humans, and intelligent agents, with the multiplier effect of technological innovation and industrial integration becoming increasingly prominent. Under the wave of digital technology and policy guidance, the publishing industry is accelerating its exploration of cutting-edge technologies and promotion of mature technology applications, continuously advancing supply-side structural reform through technological innovation.

Regarding technical service needs for integrated publishing products, the top

three categories are knowledge services, databases, and e-books, followed by digital textbooks, rich media publications, and audiobooks, while demand for technical services related to cultural creative products, animation, digital newspapers, games, and online literature remains relatively low [3]. Figure 1 [Figure 1: see original paper] illustrates the distribution of technical service needs for integrated publishing products among publishing houses.

China's publishing industry extensively utilizes mature digital technologies to meet user needs and solve practical problems. Research data from the China Academy of Press and Publication shows that content review technology is the most valued and first to be applied by publishing houses, while there remains considerable room for improvement in content production and production technology application. Related technologies have higher application levels than format-related technologies. Specifically,

## 1. Current Status and Typical Scenarios of Technology Integration in Publishing

### 1.1 Digital Technology

Digital processing technology serves as the foundational and critical technology for digital transformation in publishing, primarily converting traditional paper-based media into various editable electronic file formats through specialized solutions, involving key technologies such as pattern recognition, structural indexing, and collaborative editing and proofreading. On one hand, digital technology can effectively process large volumes of historical documents, transforming them into digital structured resources. On the other hand, by introducing digital workflows such as collaborative editing and intelligent proofreading, editorial efficiency can be greatly enhanced. China's publishing industry has accumulated years of experience in digital technology application, with some technologies achieving widespread adoption. The adoption rates of text recognition, XML fragmentation processing, and audio-video processing technologies have reached approximately 70%, while automatic keyword extraction, automatic indexing, collaborative editing and review, and intelligent proofreading have all exceeded 40%, with only a small minority of institutions yet to implement resource digitalization processing [4]. Under policy support and guidance, publishing houses are achieving full-chain digital transformation by building hardware environments, upgrading technical equipment, and reforming business processes.

### 1.2 Database Technology

As the scale and quality of China's data resources accelerate, the value of data elements is gradually being effectively released. The publishing industry features diverse data types and massive scale, with China currently adding over 200,000 new book titles annually, nearly 20,000 new audio-visual and electronic publications, more than 10,000 existing journals, and over 1,700 newspaper titles, not to mention the considerable scale of legacy publications [5]. However, the propor-

tion of database construction in China's publishing industry remains relatively low; statistics show that among more than 580 publishing institutions, only about one-quarter have established database platforms. The publishing industry can provide various service types based on databases, commonly including content retrieval, tool assistance, content payment, knowledge services, and consulting evaluation. Among these, the first three are most common, particularly content retrieval services; tool-assistance products such as "Xinhua Dictionary App" and "Wanfang Topic Selection Service"; content payment services include both individual content payments and reading permissions obtained through membership models, such as "e-books" and "digital courses," which show high dependence on sales channels.

### 1.3 New Media Technology

The accelerated development of mobile, digital, and intelligent technologies is driving the advancement of new media, giving rise to rich content forms such as short videos, live streaming, and audiobooks, and accumulating a massive user base. As of June 2024, China's short video users reached 1.05 billion, and live streaming users approached 780 million [6]. Publishing institutions are actively applying new media technologies to edit and produce multi-modal content including graphics, audio, and video, accumulating substantial traffic resources across numerous new media platforms. Data shows that in 2023, the number of active verified accounts of publishing institutions (excluding newspaper and periodical accounts) reached 2,973, a year-on-year increase of 37%, publishing over 310,000 works with total likes and total readings/views increasing by 126% and 86% respectively [7]. Short video channels demonstrate outstanding communication effectiveness; in 2023, the number of publishing houses' WeChat video channel and Douyin accounts increased by 92.6% and 78.7% respectively [8]. Science and technology, literature, and comprehensive publishing institutions have higher account influence, such as Xinhua Publishing House, Beijing Science and Technology Press, and People's Literature Publishing House. Extensive dissemination has generated high revenue growth; while physical channels continue to decline, short video e-commerce maintained rapid growth in 2023, increasing by 70.1% year-on-year, becoming the second-largest book sales channel after platform e-commerce [9]. The publishing industry overall demonstrates strong operational capabilities and development potential in new media application. Omnimedia, multi-format, and all-channel have become new characteristics of the current publishing industry's digital publishing efforts.

### 1.4 Big Data Technology

Big data technology has extensive application scenarios in the publishing industry, with assisting editorial decision-making being one of its important applications. As early as a decade ago, when Kindle and iPad began gaining increasing popularity among readers, HarperCollins utilized big data analysis of reader feedback to identify high-demand topics in the market, combining

pricing and marketing strategies with consumer insights to launch more best-sellers. The Social Sciences Academic Press has built a data warehouse using big data technology, integrating data from multiple business systems to construct a decision analysis system that provides a basis for the press's decision-making [10]. On the user side, conducting user profiling and behavioral analysis based on big data technology can more accurately identify user needs and feed them back into acquisition, editorial planning, and topic selection work, achieving personalized and precise product and service delivery. For example, the Yixin Platform, based on big data analysis of users, categorizes knowledge content into hierarchical and graded learning architectures, enabling all learners to obtain personalized content suitable for their needs, transforming "people searching for knowledge" into "knowledge finding people," saving users considerable time in retrieving the latest knowledge content.

### 1.5 Artificial Intelligence Technology

China has initially built a relatively comprehensive artificial intelligence industry system, with more than 4,500 related enterprises and a core industry scale approaching 600 billion yuan [11]. AI application scenarios have been implemented across multiple industries including publishing, with the "Excellent Cases of AI Large Model Innovative Application in Press and Publication" released by the China Academy of Press and Publication demonstrating three major paths for AI innovative application in publishing: first, empowering proprietary platforms to optimize workflows and improve efficiency; second, upgrading service functions for C-end users; and third, developing AI tools for B-end users, such as proofreading tools, editing tools, and marketing tools. In terms of internal process optimization, methods such as text mining, machine error detection, and image-text recognition can effectively improve content processing and organization efficiency while reducing editorial errors. In external services, applications have emerged in multiple areas including speech recognition, digital humans, and knowledge graphs. For example, Chongqing Classroom Inside and Outside Magazine introduced iFLYTEK's AI Chinese speech analysis technology to provide high-precision recitation quality evaluation services for users of the "Reading Helper" system; the Digital Media Group launched the Xiaorui digital human, which can serve as an "all-subject private home tutor" for homework guidance or as a "reading companion" for mass-market books and children's picture books. People's Medical Publishing House has established a medical knowledge graph using AI technology and embedded it into users' workflows to provide instant knowledge services.

### 1.6 Cloud Computing Technology

Cloud computing technology application scenarios in the publishing industry are mainly reflected in four aspects. First, it facilitates resource integration and on-demand allocation. Through cloud platforms, participants in the digital publishing industry chain can obtain resources, services, and publications on

demand. For example, the cloud services of Social Sciences Academic Press, based on Alibaba's public cloud platform, achieve on-demand allocation, immediate availability, and effective sharing of infrastructure resources for database products. Second, it promotes personalized customization and resource sharing. For instance, the digital course publishing cloud platform of Higher Education Press integrates knowledge resources for fusion publishing, providing personalized course customization applications and resource co-construction and sharing services for universities while protecting digital intellectual property [12]. Third, it helps reduce operational costs. Cloud computing effectively cuts hardware, resource, and operation and maintenance costs through distributed architectures instead of high-end hardware, elastic resource scheduling mechanisms, and automated operation and maintenance systems. Fourth, it promotes cultural dissemination abroad. Cloud publishing is an important means to help achieve international cultural dissemination, widely distributing digital publishing content globally through cloud platform distribution and social media promotion.

### 1.7 Virtual Reality Technology

Virtual reality technology represents the culmination of rapid development in computer software and hardware technology, sensor technology, robotics technology, artificial intelligence, and behavioral psychology. As AI, VR, AR, and other technologies become more mature, more extensive and integrated technology application forms have emerged, such as the metaverse and virtual digital humans. Education is a typical industry for VR technology implementation, with changes in educational methods driving upgrades in educational publishing demand. For courses with high practical requirements, the interactivity of VR can help students conduct hands-on operations independently while avoiding practical risks. For example, People's Medical Publishing House's *3D Systematic Anatomy* uses VR technology to build a series of tutorials, allowing users to view virtual anatomical models created from 3D digital models from any perspective in a virtual anatomy laboratory through the combination of hardware systems and wearable devices. Electronic Industry Press's *Indoor VR Scene Production Tutorial* combines VR technology with professional knowledge related to the construction industry, enabling learners to quickly master indoor VR scene drawing methods and processes through real-scene interaction into virtual buildings. In popular science education, Tiandi Press's *Dreamlike Future Reality* uses AR, VR, MR, holographic imaging, and motion capture technologies, allowing readers to create a world combining virtual and real elements. VR publishing expands books from single forms to diversified formats and has achieved a series of results in practice, yet still faces challenges such as high application costs, insufficient technology maturity, and shallow integration.

### 1.8 Digital Copyright Protection Technology

As publishing industry content resources are primarily in digital form, digital content is easy to disseminate and replicate in the internet environment, with

low infringement costs and often difficult traceability, making digital copyright protection a critical issue. However, approximately one-quarter of publishing houses have yet to adopt digital content copyright protection measures, and the application of digital copyright protection technology among publishing houses remains at a relatively basic stage, with digital watermarking technology being the most widely used, while blockchain, as a cutting-edge copyright protection technology, currently has low adoption rates. As content production and dissemination become increasingly convenient and infringement costs decrease, new types of infringement cases are increasing, especially facing complex intellectual property legal issues and challenges brought by the rapid development of AIGC. Traditional digital copyright protection regulations and technologies have become difficult to adapt to infringement issues under the new situation. Cases such as the highly industry-watched Hangzhou virtual digital human infringement case and the Beijing AIGC-generated image infringement dispute will only increase with the continuous development and wide application of intelligent technologies. Therefore, digital content copyright protection technology also needs to advance with the times, doing a good job of copyright protection at the source creation stage to reduce infringement probability.

## **2. Existing Deficiencies in Publishing Industry Technology Integration**

### **2.1 Lack of Perfect Technology Application and Innovation Mechanisms**

Most publishing houses' existing organizational structures and incentive mechanisms are often designed around traditional business operations, making it difficult to adapt to the new trends of integrated development under the background of technological innovation. The common multi-level, multi-link pyramid organizational structures in the industry tend to make many departments independent information silos with insufficient horizontal connections. Departments, considering their own interests, show low willingness to share resources with other departments, presenting varying degrees of separation across business chain links. This is difficult to match with the forms of integrated publishing. The business chain under technology integration requires overall control and cross-departmental collaboration to connect planning, production, sales, and other stages, which limits the breadth and depth of technology integration development. Additionally, many publishing houses have not yet formed incentive mechanisms for technological innovation, with insufficient investment in new technology application and innovation, or inadequate profitability of integrated products after investment, further affecting the enthusiasm for investment.

## 2.2 Technology Integration Products Lack Matching Operation Models

In the new media era, the traditional operation mechanisms of the publishing industry have been impacted, with integrated products often having small user scales, low visibility, and difficulty in achieving widespread recognition. Currently, many publishing institutions do not have dedicated new media operation teams, with most editors serving dual roles, resulting in incomplete team building and limited operational capabilities, and weak content attractiveness. Most content published by publishing institutions' new media accounts remains at the level of simple book introductions, failing to create unique personas that attract user interest through in-depth, extended, and attention-grabbing topics; content formats still tend to focus on familiar graphic areas, while communication capabilities in audio-video and live streaming need strengthening, as graphic areas focus more on content display while lacking interaction and monetization capabilities. In the big data era, building a data management and utilization system throughout the entire business process has become an important measure for enterprise operation. Most institutions have not yet established effective data operation mechanisms. Centralized, radiation-style content dissemination remains mainstream, with consumers passively receiving content information, limiting both content dissemination scope and product operation effectiveness.

## 2.3 Lack of Relevant Technology Integration Application Standards and Specifications

Publishing industry technology application standards are important means to promote deep publishing integration and high-quality development. Under the guidance of the National Press and Publication Administration, multiple technical standards and application specifications have been introduced in recent years, covering QR codes, image recognition, virtual reality (VR), augmented reality (AR), blockchain, and other fields, providing important support for the standardized application of new technologies in publishing. Overall, existing standards are primarily general basic standards with some systemic deficiencies and implementation challenges. Due to the lack of unified architecture and related supporting standards, such as data security and copyright ownership specifications, enterprise standards operate independently with poor cross-platform compatibility, leading to difficulties in resource integration and disconnects between technology R&D and standard specifications, which is not conducive to technology cooperation between publishing houses and technology enterprises within the same framework.

## 2.4 Shortage of Integrated Publishing Technology Talents

Under the background of digital transformation, publishing houses have explored various integrated publishing products, but connecting them with original business operations requires integrated talents who master both emerging technologies and business processes. Currently, most publishing houses still

focus on traditional business, with traditional editors comprising the vast majority, low proportions of digital publishing practitioners, and low proportions of full-time technical personnel. Meanwhile, there remains a certain gap between talents cultivated by universities and industry demands. On one hand, the scale of compound talents cultivated by universities is small and cannot meet the rapidly developing industry needs; on the other hand, the problem of detachment from reality is prominent in talent cultivation, with a gap between textbook theory and practice learned by students, making it difficult for them to quickly adapt and match job requirements after graduation.

### 3. Development Recommendations

To comprehensively enhance the overall, systematic, and coordinated nature of technology integration in the publishing industry, address difficulties in technology development and utilization, it is necessary to strengthen top-level design from policy guidance and industry collaboration perspectives, and build a systematic technology application framework. At the policy level, the effects of “project-driven” and “demonstration-led” approaches can be further strengthened, and assessment mechanisms improved; cross-departmental collaborative policies can be introduced, such as special fiscal support funds and tax incentives, to encourage enterprises to increase technology R&D investment. At the industry level, relying on the national data sharing and exchange platform and national cultural big data construction, the construction of technology and data infrastructure suitable for publishing industry development can be coordinated and optimized to provide low-cost technology tools and scenario-based service support for small and medium-sized publishing enterprises; cross-industry technology collaboration can be promoted to absorb the strength of internet enterprises and scientific research institutions, jointly building open laboratories to deeply explore application scenarios of cutting-edge technologies such as artificial intelligence and virtual reality in publishing, achieving a transformation of publishing technology integration from “passive adaptation” to “active leadership.”

#### 3.2 Increase R&D Investment and Enhance Technology Innovation Application Capabilities

Since the 18th Party Congress, China’s overall scientific and technological innovation strength has steadily improved, successfully entering the ranks of innovative countries. The enhancement of innovation capabilities cannot be separated from high R&D investment. From 2012 to 2023, the intensity of society-wide R&D funding increased from 1.91% to 2.64%, exceeding the average level of EU countries [13]. Overall, the publishing industry’s investment in technology remains insufficient. In terms of funding, 46.15% of enterprises invest less than 10% of their total funds in integrated publishing business, 36.92% invest between 10% and 30%, and only 12.31% invest more than 50% [14]. In terms of personnel, the number and proportion of full-time technical personnel are not high, with

nearly 60% of publishing houses having fewer than 10 full-time technical staff. Publishing houses need to strengthen R&D investment in integrated publishing technology, address technological shortcomings facing integrated publishing development, and provide more tolerant and broad development space for integrated publishing.

### **3.3 Promote Standardization and Improve Technology Application Standard Systems**

The improvement of integrated publishing development efficiency requires the formation of unified technical standards. In content production and production, attention can be paid to establishing standard systems for new technologies such as audiobook recording, smart education micro-course development technology, AR/VR production, 3D model storage, big data, cloud computing, and artificial intelligence [15]. In digital asset management, standards can be developed for book resource storage and digital content resource management. In distribution and marketing, standards can be established for digital content dissemination evaluation, digital resource distribution, data transmission, and sales platforms. In copyright protection and management, corresponding standards can be formulated for technologies related to network security and copyright protection. By establishing technology application standards suitable for the characteristics of China's publishing industry, the standardized and sustainable development of publishing houses and technology enterprises can be promoted, and cutting-edge and mature technologies can be deeply integrated into publishing business.

### **3.4 Strengthen Talent Teams and Improve Technology Talent Cultivation and Management Systems**

Currently, the publishing industry faces a series of talent team construction dilemmas in the process of technology integration, requiring urgent adoption of countermeasures. First, improve the compensation system and talent cultivation model. To address the relatively high market salary levels for technical personnel, it is recommended that publishing houses strengthen market alignment, formulate competitive compensation policies, and provide more benefits and career development opportunities. It is suggested to help publishing houses overcome difficulties in recruiting and cultivating technical talents through special funds and policy support. Second, establish a compound talent cultivation system. For compound talents who understand both business and technology, formulate professional technical qualification evaluation standards, clarify conditions for professional title promotion, and open up career development paths. Strengthen training and guidance for existing personnel to cultivate and enhance the technical literacy and comprehensive quality of publishing staff. Finally, deepen exchanges, cooperation, and joint cultivation. Strengthen cooperation with universities and vocational training institutions, establish technical talent reserve pools, and accelerate the speed of independent talent cultivation through internships and training programs to enhance talent technical literacy.

## References

- [1] 2023 Digital Publishing Industry Overall Scale, Increased 19.08% Year-on-Year [EB/OL]. (2024-09-21)[2025-02-10]. <https://www.cbbr.com.cn/contents/499/94478.html>.
- [2] Liu Kunxiang, Wang Biao. Reflections on Data Assetization in the Publishing Industry Under the “Data Elements ×” Background [J]. Publishing Research, 2024(08): 5-15.
- [3] The 2023 Influence Ranking of 2,973 Publishing Institution New Media Accounts is Here! [EB/OL]. (2024-03-28)[2024-11-22]. [https://www.sohu.com/a/767509345\\_{121418230}](https://www.sohu.com/a/767509345_{121418230}).
- [4] Which Publishing Institution Has the Strongest New Media Influence? Latest List Released! [EB/OL]. (2024-04-29)[2024-11-15]. <http://press.hust.edu.cn/info/1039/3719.htm>.
- [5] Economic Daily, Short Videos Become the Second Largest Book Sales Channel [EB/OL]. (2024-04-23)[2024-11-15]. [http://paper.ce.cn/pc/content/202404/23/content\\_{293400}.html](http://paper.ce.cn/pc/content/202404/23/content_{293400}.html).
- [6] Xie Shouguang. Academic Publishing in the Big Data Era [J]. China Editor, 2017(04).
- [7] China’s Artificial Intelligence Core Industry Scale Has Approached 600 Billion Yuan [EB/OL]. (2024-09-13)[2024-11-20]. <https://www.chinanews.com.cn/cj/2024/09-13/10285775.shtml>.
- [8] Consumption Daily. 4 New Products Officially Unveiled, Tianwen Shumai Layouts Education Informatization 2.0 [EB/OL]. (2019-03-08)[2024-11-25]. [http://m.haiwainet.cn/middle/3543159/2019/0308/content\\_{31511529}1.html](http://m.haiwainet.cn/middle/3543159/2019/0308/content_{31511529}1.html).
- [9] People’s Tribune Network - People’s Tribune Magazine, China’s Scientific and Technological Innovation Achievements and Prospects in the New Era [EB/OL]. (2024-12-10)[2024-12-11]. <http://www.rmlt.com.cn/2024/1210/718940.shtml>.
- [10] Cao Shisheng, Fan Jun. Integration and Innovation: Empowering High-Quality Publishing Development with New Technology [J]. Technology and Publishing, 2020(5): 29-34.
- [11] Xu Dong, Cui Ran. Discussion on the Development Trends of China’s Digital Publishing Integration [J]. Publishing Wide Angle, 2020(5): 15-18.
- [12] Zhang Xinxin. Generative Intelligent Publishing: Principles, Evolution, and Enlightenment of Knowledge Generation: From Wisdom-Driven to Data-Driven [J]. Editing Friends, 2023(11): 36-45.
- [13] Chen Change, Tian Fangbin. Analysis on the Integrated Development Path of Publishing Industry Under the New Situation [J]. Publishing Wide Angle, 2023(17): 47-52.
- [14] Xie Wei. Smart Publishing: Building a New Integrated Development System for Academic Publishing [J]. Publishing Wide Angle, 2022(9): 28-34.

[15] Li Hong. Technology-Driven Digital Transformation: Publishing Enters High-Quality Development [J]. New Reading, 2021(12): 7-10.

**About the Author:** Wang Yang (1980—), female, from Baoding, Hebei, holds a master's degree and is an associate editor. Her research focuses on publishing technology, knowledge services, and integrated publishing.

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

*Source: ChinaXiv — Machine translation. Verify with original.*