

## New Challenges and Post-print Responses for China's Publishing Industry under the Trend of Global Knowledge Integration

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### Abstract

Global knowledge fusion represents both an inevitable requirement and a concrete manifestation of the upgrading of readers' consumption demands in the big data era. While knowledge fusion offers new opportunities and pathways for service transformation in the publishing industry, it also introduces numerous challenges. This paper analyzes the related issues concerning knowledge fusion's impact on market positioning, integration mechanisms, product forms, and service models within the publishing industry, and proposes potential solutions through industrial chain innovation, product innovation, and service innovation.

### Full Text

#### Global Knowledge Fusion Trends: New Challenges and Responses for China's Publishing Industry

**Abstract:** Global knowledge fusion represents an inevitable requirement and concrete manifestation of evolving consumer demands in the big data era. It provides new opportunities and pathways for service transformation in the publishing industry while simultaneously presenting numerous challenges. This paper analyzes the issues that knowledge fusion poses for market positioning, integration mechanisms, product forms, and service models in the publishing industry, and proposes potential countermeasures from the perspectives of industrial chain innovation, product innovation, and service innovation.

**Keywords:** big data learning; knowledge fusion; digital publishing; challenges and responses

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In the big data era, the vast volume of information resources has diversified the channels through which readers acquire knowledge. The relationship between scientific research and “big science, big demand, big data, big computing, and big discovery” has become increasingly close [1]. Big data—characterized by large scale, multi-source heterogeneity, cross-domain, cross-language, and cross-media features—plays an increasingly important role through its interconnections and intersections [2]. Data-intensive science, i.e., scientific research based on big data, has become the fourth scientific paradigm following experimental science, theoretical science, and computational simulation science [3]. Under this new paradigm, users’ demands for knowledge services have undergone profound changes: their requirements for resources and services are no longer limited to localized resources but instead seek to access large-scale, multi-source heterogeneous, cross-domain, cross-media, cross-language, dynamically evolving, and universal global knowledge resources through a more open and integrated knowledge space [4-6].

Knowledge fusion provides a means for knowledge content association, reorganization, and ordering through processes such as acquisition, matching, integration, and mining of massive, dispersed, and heterogeneous knowledge resources. It eliminates redundant and useless knowledge to construct a complete knowledge fusion service system—including disciplinary knowledge panorama graphs, business knowledge graphs, and personalized knowledge graphs oriented toward disciplinary applications and innovative services—thereby providing precise knowledge services for problem-solving in specific domains [7].

Knowledge fusion has become an effective pathway to meet users’ new demands and transform knowledge services in the big data era. Simultaneously, it provides new opportunities, approaches, methods, and means for the publishing industry to deepen its knowledge service transformation, yet it also presents novel challenges to traditional market positioning, integration mechanisms, product forms, and service models.

## 1. New Challenges for the Publishing Industry Under the Trend of Global Knowledge Fusion

Knowledge fusion encompasses not only the integration of multi-source knowledge resources but also the convergence of dissemination models, service models, and application methods, which will give rise to new product forms and publishing models. This paper analyzes the impending issues for the publishing industry from four dimensions: market positioning, integration mechanisms, product forms, and service models.

### 1.1 Market Positioning Issues

Global knowledge fusion is inherently cross-disciplinary, cross-industrial, and cross-national, which will inevitably pose severe challenges to the existing competitive landscape of the publishing market. Its continuous development will catalyze revolutionary transformations on both the supply and demand sides of the publishing industry. Traditional publishing enterprises will face competitors not only from domestic peers but also from outside the industry and international rivals, risking “dimensionality reduction strikes” from other sectors. The competitive landscape will intensify significantly. The industrial structure of publishing will be reconstructed, and the roles and positioning of publishing enterprises will be reshaped. Knowledge fusion demands that the publishing industry target the global market, strengthen competitive awareness, engage in deep industrial collaboration through both inward introduction and outward expansion, and actively participate in international competition.

[Figure 2: see original paper] Comparison of Publications in International vs. Domestic English-language Journals. Competition in the publishing industry is first and foremost a battle for quality content—that is, a contest for excellent manuscript sources. Taking journals as an example, Chinese journals face increasingly severe international competitive pressure for manuscripts. Statistical data from 2015-2017, shown in [Figure 2: see original paper], reveals that domestic English-language journals published an average of 23,700 articles annually, with foreign-authored papers accounting for only 15.37%; domestic Chinese-language journals published an average of 806,500 articles annually, with foreign-authored papers comprising merely 0.76%; while the nation’s average annual publications in foreign journals (SCI) reached 305,900 articles, representing 27.02% of the total national output and growing at an average annual rate of 10.25%. The serious outflow of high-quality Chinese research output to foreign publications warrants profound reflection and vigilance.

### 1.2 Integration Mechanism Issues

Knowledge resources in the big data era exhibit characteristics of multidimensionality, multi-sourcing, heterogeneity, fragmentation, uncertainty, and dynamism [8]. The knowledge to be integrated includes not only structured, unstructured, and semi-structured data but also various types such as literature, business data, models, and system data. Therefore, researching knowledge fusion in big data environments necessitates addressing integration algorithms, frameworks, models, and the consequent issues of intellectual property rights and resource cooperation models. Research on knowledge fusion framework models, standards, and algorithms is a prerequisite for effective knowledge fusion. Under the global knowledge fusion model, the publishing industry will form entirely new copyright and resource cooperation models, as illustrated in [Figure 3: see original paper].

[Figure 1: see original paper] Relationship Diagram of Knowledge Fusion and Publishing Industry Transformation. Figure 1 depicts the relationship between knowledge fusion and the transformation and upgrading of publishing industry services. Knowledge fusion can promote the upgrading of digital transformation services in publishing, while direct user-oriented demand collection by the publishing industry can provide effective guidance for better knowledge integration. Both share the consistent goal of providing precise knowledge services to readers.

**1.2.1 How to Achieve “Aggregation,” “Interconnection,” and “Utilization” of Heterogeneous Multi-source Knowledge Resources** After years of accumulation, publishing data, business data, government data, and social data have each developed unique metadata standards, with their cataloging content revealing respective content and business characteristics. Therefore, to achieve integration of global heterogeneous multi-source knowledge resources, it is essential to establish a resource classification standard and metadata processing system that can accommodate the data characteristics of all knowledge resources and is oriented toward disciplinary innovation applications, thereby enabling effective fusion of various publishing data resources.

**1.2.2 Knowledge Fusion Raises Copyright Issues, Challenging Traditional Copyright Models** Knowledge fusion will disrupt the traditional interest distribution pattern among information owners, disseminators, and users [9], necessitating the design of resource cooperation mechanisms among various sources and entities under the knowledge fusion model. With the widespread 普及 of the Internet today, information dissemination has accelerated and information density has increased, while copyright infringement will also exhibit rapid growth. How to employ digital copyright technologies, dissemination process traceability, and other measures...

**1.2.3 Knowledge Fusion Will Affect Traditional Resource Cooperation Models, Necessitating New Cooperation Models for the Fusion Era** Traditional resource cooperation models authorize usage by entire journals, complete books, by discipline, etc. Under the knowledge fusion model, the new knowledge system will break traditional resource classification and cooperation models, with knowledge granularity becoming finer and existing as fragmented knowledge elements and knowledge networks. New resource cooperation models will likewise adopt fragmented forms for authorization, usage, and service.

### 1.3 Product Form Issues

Knowledge fusion is user-demand-oriented and unconstrained by knowledge carriers, sources, forms, or formats. It will transcend traditional publication product forms such as books, journals, newspapers, textbooks, and academic monographs, while the resources requiring integration will also be cross-terminal and

cross-carrier. Global knowledge fusion will inevitably force a comprehensive upgrade of production models and product forms in publishing, impacting traditional resource operation models.

In a global knowledge fusion environment, publishing content production will move beyond traditional whole-book processing and field indexing modes such as title, subject, and keywords, focusing instead on fragmented processing, knowledge element extraction, ontology library construction, enhanced publishing, and other innovations, thereby driving product form upgrades.

[Figure 4: see original paper] Impact of Knowledge Fusion on Production Models and Product Forms

To facilitate user access, enable rapid and precise acquisition of needed knowledge resources, shorten traditional product publication cycles, and deliver the latest achievements to users as quickly as possible, multiple new product forms will emerge: (1) Data publications featuring various scientific research data, such as observational, recorded, experimental, testing, surveying, and design data, published rapidly. This breaks the systematic content model of traditional publications to enable swift publication of important latest results. (2) Enhanced publications that insert detailed materials about research problems, ideas, methods, processes, data, and results into papers to facilitate review, verification, evaluation, application, and learning, such as those including theoretical derivations and experimental processes. (3) Collaborative publications that link contribution statements for each author at the paper's attribution section and record research contributions of team members on collaborative work platforms. (4) Whole-process publications that document and register each individual's specific work and achievements throughout the research process.

#### 1.4 Service Model Issues

The purpose of knowledge fusion is knowledge service—providing solutions to users' practical problems and helping solve them, while also issuing warnings and contingency plans for issues users have not yet encountered but may face. Therefore, knowledge fusion should place greater emphasis on the “utilization” of knowledge on the basis of “aggregation” and “interconnection,” namely, the fusion of application scenarios built upon data integration. It should precisely embed itself into users' research, work, and learning processes to provide problem-oriented knowledge services.

Establishing a central thread that connects all stages of knowledge production, dissemination, diffusion, and utilization is essential for smoothing knowledge fusion mechanisms and represents the development direction of knowledge fusion. Existing service models mostly exist in isolation from actual work. How to achieve deep integration between knowledge services and application scenarios becomes the key to whether knowledge fusion can solve the problem of service precision.

The “human-knowledge resources-work scenario” trinity and scenario-aware intelligent knowledge service illustrated in [Figure 5: see original paper] represent an effective pathway to realizing knowledge fusion. The platform can automatically aggregate various knowledge resources and push needed knowledge automatically based on users’ work scenarios, positions, and functions, thereby achieving deeper intelligent knowledge services.

## **2. Addressing Challenges in Deepening Knowledge Service Transformation in the Publishing Industry**

In response to the above challenges, we propose that the publishing industry must deepen its knowledge services during digital transformation and offer the following countermeasures.

### **2.1 Grasping the Trend of Global Knowledge Fusion and Constructing a Complete Industrial Ecosystem for Publishing Services**

Traditional publishing businesses have focused primarily on content processing and publishing, providing content services such as books and journals. The publishing industry’ s industrial chain has typically comprised publishers, authors, printing houses, and distributors, with editors or authors at the center. However, under the current model, the target of publishers’ knowledge services should be readers. Readers’ demands for scientific research work require global knowledge fusion. The publishing industry should leverage its existing content, face its ultimate service users, grasp the trend of global knowledge fusion, and provide precise knowledge services.

Through in-depth analysis of the publishing industry’ s own industrial chain and using publications as the medium, all stages—from content production, processing, and publishing to dissemination and application—must fully consider how to lay a solid foundation and provide excellent services for knowledge fusion. The production process should be reconstructed to enable multi-party participation and open collaboration among authors, publishers, publishing dissemination operators, and readers, connecting all stages of knowledge production to build a complete industrial ecosystem for publishing services.

### **2.2 Transforming Traditional Publishing Business Concepts and Innovating Product Forms Oriented Toward Demand**

Currently, various publishing houses in China focus primarily on books and journals (print and electronic versions), often characterized by one-time production, single application, and one-way dissemination. They have failed to deeply study reader demands and develop extended services along the cultural industry’ s development chain. The Internet has transformed traditional publishing operation models; publishing is no longer a static job of content production and processing but a dynamic, process-oriented category from knowledge production to

application [10]. Under the development trend of global knowledge fusion, publishing practitioners should no longer engage in one-way product output but actively establish connections with reader-users, focus on what content users need, continuously improve product design systems, and innovate publishing product forms [11].

Providing quality knowledge services under the demands of knowledge fusion is not simply about integrating literature, professional domain data, and knowledge units, but rather focuses more on establishing and reconstructing relationships among data, information, and fragmented knowledge. People's information acquisition needs are no longer concentrated on large blocks of content but on specific knowledge nodes, from which they navigate related knowledge networks to find other relevant nodes. Therefore, we must break the traditional publishing and sales model of whole books and entire journals. Through database technologies, product content should be fragmented and processed, then diversely integrated and correlated to form different service products for different users, including fragmented publications, data publications, and research process publications. On this basis, various products can be packaged according to user needs, such as industry knowledge bases, fragmented chapter knowledge bases, and thematic knowledge bases, with corresponding authorization rules and resource cooperation models.

### **2.3 Integrating Human, Knowledge, and Work Scenarios to Precisely Embed into Scientific Research Work and Learning**

In the increasingly competitive economic society, the “service” characteristic of knowledge services is becoming more prominent—those who can provide users with more direct and efficient services will gain a more advantageous position in fierce competition. The increasingly significant personalized demands of research users pose enormous challenges and pressures to traditional generic knowledge services [12]. Embedded knowledge services aim to break through the limitations of traditional library knowledge services by integrating into the entire process of users’ scientific research, work, and learning [13]. Their main forms include embedding in ubiquitous knowledge environments, embedding in user contexts, and embedding in scientific research and learning processes [14]. For instance, thesis proposal services for graduate students provide targeted support throughout the entire process—from topic selection (in-depth analysis of various research fields) and literature reading to research plan formulation and proposal writing. Moreover, various services can be personalized and customized based on user profiles, including research history, disciplinary classification, and knowledge structure.

Global knowledge fusion is an inevitability for readers’ reading and learning in the Internet and big data environment. However, in the fusion process, the publishing industry will face numerous issues in market positioning, integration mechanisms, product forms, and service models. Knowledge fusion is not merely the fusion of big knowledge data but also includes the integration of

terminals, product forms, and application modes. Therefore, the publishing industry should face readers' learning needs, integrate knowledge services with business processes, embed them into research, learning, and work processes, optimize and upgrade publishing and operation models, and actively explore effective pathways and methods to achieve precise knowledge services.

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