Bibliometric Analysis of Research Hotspots in Digital Publishing Based on Postprint Data from CNKI Academic Journal Papers

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Abstract

【Purpose】 To clarify the academic development trajectory of digital publishing research, grasp its research dynamics, and identify research hotspots, this article provides a comprehensive review of relevant literature, showcasing the research achievements in this field.

【Method】 Bibliometric analysis methods were employed, aided by knowledge graph visualization analysis tools.

【Results】 A knowledge graph of the digital publishing research domain was constructed, highly-attended research topics were categorized into four clusters, and research hotspots and important research contents were reviewed.

【Conclusion】 Through literature review and bibliometric analysis, it was found that digital publishing research features diverse perspectives and continuously enriching content, keeping pace with national macro-development themes. However, problems remain, such as insufficient exploration of regularities and inadequate knowledge increment in research.

Full Text

Bibliometric Analysis of Research Hotspots in Digital Publishing: Based on Academic Journal Data from CNKI

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Abstract: [Objective] To clarify the academic development trajectory of digital publishing research, grasp research trends, and identify hotspots, this article provides a comprehensive review of digital publishing literature, presenting research achievements in this field. [Method] Using bibliometric analysis methods and knowledge mapping visualization tools. [Results] Constructed a knowledge

map of the digital publishing research field, summarized high-attention research topics into four clusters, and reviewed research hotspots and important content. [Conclusion] Through literature review and quantitative analysis, it was found that digital publishing research has diverse perspectives, continuously enriched content, and follows national macro-development themes, but still has problems such as insufficient regularity exploration and insufficient knowledge increment.

Keywords: digital publishing; bibliometrics; research hotspots; cluster analysis; knowledge map

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Digital publishing is a new publishing method that emerged with the development of Internet and information technologies. In the late 20th century, some prototypes of digital publishing appeared, such as desktop publishing and electronic publishing. Domestic research on digital publishing started relatively late. The *2004-2005 China Publishing Industry Development Report* provided a preliminary broad definition of the digital publishing concept [1], after which numerous researchers in this field explored the conceptual connotation of digital publishing, issues and paths for traditional publishing' s transformation to digital publishing, and the application of emerging technologies in digital publishing. Meanwhile, China' s digital publishing industry has achieved rapid development, with its revenue scale growing from nearly 1.6 billion yuan in 2002 to 1,178.167 billion yuan in 2020 [2]. The digital publishing industry chain continues to extend, and its business models show diversified and innovative development trends. Reviewing the development of the digital publishing field, both theoretical research and practical application have yielded rich achievements. Organizing research results under different themes in digital publishing research and presenting the evolution of digital publishing studies are of great value for deeply understanding the content and current status of digital publishing research and for identifying research hotspots and trends.

This article adopts bibliometric analysis methods and knowledge mapping visualization tools to comprehensively review digital publishing literature, striving to comprehensively display research achievements in this field, summarize the current status and development 脉络 of digital publishing research, and provide useful references for researchers in related fields.

1. Data Description and Processing

The data for this study comes from the CNKI Chinese Journal Full-text Database. Digital publishing is a new publishing method that emerged with the development of Internet and information technologies. The study first searched the database for literature with "digital publishing" as the theme, retrieving 14,700 journal papers. To precisely locate literature highly relevant to digital publishing research, a search was conducted for papers with "digital publishing" in the title, yielding 4,687 academic journal records. Considering the authority and representativeness of the research, the records were further screened to include only literature from Peking University core journals and CSSCI source journals in the CNKI database, resulting in 1,976 retrieval records. The time span ranged from 2004 to 2021. After removing non-valid records such as conference reviews, journal announcements, and submission requirements, 1,938 literature data entries were finally selected. During the search process for papers related to the theme of "digital publishing," the earliest record found was a journal article titled "From Electronic Publishing to Digital Publishing" published in *China Electronic Publishing* in 2000. It should be noted that the first record retrieved from CNKI by time is not the starting point of digital publishing research. Before this, there were already early research literature on digital publishing, and besides journal papers, there are also related research monographs, dissertations, and foreign literature. This article selects journal papers from CNKI as the research data sample and then uses bibliometric and knowledge mapping analysis tools CiteSpace and VOSviewer software, employing keyword co-occurrence analysis and cluster analysis methods to conduct multi-dimensional analysis of the obtained data.

2. Bibliometric Analysis Results

In terms of annual publication volume (Figure 1 [Figure 1: see original paper]), digital publishing research can be roughly divided into three stages. Before 2010, it showed a continuous upward trend, with academic research on digital publishing still in the initial theoretical exploration phase. From 2010 to 2017, the average annual publication volume exceeded 100 papers, with some years exceeding 200 papers, representing a peak period of academic research and a rapid growth phase for digital publishing studies. After 2017, digital publishing research tended toward stable development and continuously extended to some emerging technology themes with the advancement of digital technology, with research content continuing to deepen.

Regarding the source journals publishing digital publishing research results, from 2004 to 2021, there were 16 journals with more than 10 publications, with their distribution shown in Figure 2 [Figure 2: see original paper]. Among them, five journals had a total of more than 100 publications on digital publishing: *Publishing Wide Angle* (304 papers), *Science-Technology & Publication* (275 papers), *Publishing Research* (250 papers), *China Publishing Journal* (240 papers), and *Chinese Editors* (118 papers).

A total of 3,647 keywords from journal papers were statistically analyzed to obtain the top 20 keywords by co-occurrence frequency (Table 1). From the perspective of the year when keywords first appeared in the selected literature, the first decade of the 21st century belonged to the rapid growth phase of digital publishing research. After the concept of digital publishing was proposed, theoretical debates on its concept, exploration of its content, and delineation of its extension gradually enriched. Some research points out that the concept of digital publishing was used as early as in Professor Xie Xinzhou' s book *Digital Publishing Technology* published in 2002 [3]. The official appearance of the term "digital publishing" in national-level official documents can be traced back to the *Eleventh Five-Year Plan for National Economic and Social Development of the People' s Republic of China* in 2006 [4], which mentioned in the chapter "Strengthening Socialist Cultural Construction" the need to "develop modern publishing and distribution, actively develop digital publishing, and attach importance to online media construction."The proposal of digital publishing brought opportunities and challenges to the traditional publishing industry, especially for academic journals and scientific journals with high digital reading demand. How to accelerate transformation to seize the dividends brought by digital technological progress while simultaneously solving issues such as digital publishing copyright protection became key research content.

Cluster analysis uses statistical algorithms to calculate the correlation of co-occurring keywords or subject terms in literature, grouping closely related terms together to mine hidden information [5]. Using VOSviewer software to conduct co-word cluster analysis on digital publishing research literature from 2004 to 2021, a keyword cluster analysis view of digital publishing was obtained (Figure 3 [Figure 3: see original paper]). Keywords of the same color belong to one cluster, indicating that these subject terms are closely related in content, forming an associated network with research commonalities. To further clarify the development 脉络 of these research themes in the time dimension, the knowledge mapping visualization tool CiteSpace was used to display the relationships and evolution among research themes under different clusters (Figure 4 [Figure 4: see original paper]). The CiteSpace timeline view focuses on showing relationships between clusters and the diachronic 梳理 of different literature within a cluster [6]. The timeline view divides digital publishing research into 10 clusters: digital publishing, publishing houses, talent cultivation, scientific journals, big data, CNKI, editing, media convergence, mobile publishing, and innovation capability, each with a corresponding evolution 脉络 of research themes. The following analysis takes the "big data" cluster as an example. In the selected literature, big data first appeared in the digital publishing research field around 2013, with research themes mainly focusing on digital copyright protection, correlation analysis between data technology and digital publishing models, development trends of the digital publishing industry in the big data era, and how the publishing industry can use big data to innovate development models. As time progressed, digital technology continued to develop and update, and the application of emerging technologies such as blockchain, artificial intelligence,

VR, and AR became new research topics in digital publishing. In addition, research themes in each cluster also intersect with related themes in other clusters, and these cross-relationships can be seen from the time network lines in Figure 4.

Figure 5 [Figure 5: see original paper] presents hot topics in digital publishing research from 2004 to 2021 in different time periods. The figure also shows that before 2010, research hotspots mainly focused on exploring the relationship between traditional publishing and digital publishing, digital transformation of the publishing industry, and problems and strategies in the transformation of various publishing units. From 2010 to 2015, research hotspots mainly included business models and development paths of digital publishing, digital publishing talent cultivation, digital copyright protection, digital content production, and research on the integrated development of traditional and digital publishing. Research themes after 2015 cover studies on digital publishing-related issues in the context of emerging digital technologies such as big data, 5G, blockchain, and artificial intelligence, and are closely related to popular topics of the era, such as the "Belt and Road" initiative and high-quality development.

3. Analysis of Hot Topics in Digital Publishing Research

Through keyword co-occurrence analysis, cluster analysis, and 梳理 of the development 脉络 of research themes, combined with representative literature on digital publishing research topics, research hotspots in the digital publishing field can be roughly divided into four clusters: research on the conceptual connotation of digital publishing, research on digital transformation of traditional publishing, research on digital publishing talent cultivation, and digital publishing research in the context of emerging digital technologies.

3.1 Research on the Conceptual Connotation of Digital Publishing

After the concept of digital publishing was proposed, debates on its definition, exploration of its connotation and extension were essential, and the concept of digital publishing was continuously clarified through researchers' theoretical exploration. A digital publishing concept widely accepted and recognized by the academic community can not only reduce the cost of academic communication among researchers but also promote the construction of a unified discourse and research paradigm in this field.

Digital publishing initially referred to using digital technology to publish paper-based publications. In its early development, its publishing forms were mainly divided into electronic publishing and online publishing. Xu Lifang referenced and drew on the definition of digital publishing by Xie Xinzhou and others, distinguished several different forms of digital publishing, and defined digital publishing as the use of binary code to store all information in the editing, processing, production, and distribution processes in optical, electrical, and magnetic media, and using computers or similar devices to use and transmit

information [7]. Since then, some researchers have compared related concepts of digital publishing, such as desktop publishing, online publishing, wireless publishing, mobile publishing, and cross-media publishing, at the levels of conceptual evolution and technology application. The concept of digital publishing has also continuously evolved with the transformation of digital technology. Luo Bingxue analyzed and elaborated on the characteristics of the digital publishing concept in different contexts from several aspects: technical means, digital content production, communication media, all-media, and full-process [8]. In the process of reviewing nearly 20 years of research on the digital publishing concept, Zhang Xinxin summarized three schools of thought: the binary code theory, the digital technology theory, and the all-media theory, and derived the concept that "digital publishing refers to a new type of publishing that uses digital technology to edit and process works and then disseminates them through copying" while summarizing and refining these main viewpoints.

3.2 Research on Digital Transformation of Traditional Publishing

The advancement of computer networks, multimedia, and digital technology has brought varying degrees of innovation to readers, publishing units, and the digital publishing industry. From the perspective of readers, convenient, efficient, and content-rich reading experiences are pursued. Compared with traditional paper reading, diverse reading forms such as computers, mobile phones, digital libraries, and handheld readers are increasingly popular among readers. As providers of knowledge services and digital content, publishing units inevitably face digital transformation. Many researchers have studied the current development status and advantages of China' s digital publishing, as well as the resistance and development strategies in the digital transformation of traditional publishing. The main advantages of digital publishing over traditional publishing are shorter publishing cycles, reduced operating costs, broader publishing markets, and convenient search and access. Li Jie summarized the problems in the digital transformation and upgrading of traditional publishing as blindly pursuing technology, developing path dependence, suboptimal content quality, and lack of high-quality publishing talents [9]. Therefore, in the process of responding to digital transformation, traditional publishing' s optimization paths, which are key research content in academia, include enriching and optimizing publishing content, establishing a mechanism for cultivating and introducing composite talents, and developing profit models for the digital publishing industry chain.

Due to digital publishing' s higher circulation efficiency and lower replication costs compared to paper publishing, digital copyright protection is also an important research content that cannot be ignored. First, some consumers' weak awareness of digital copyright protection leads to continuous purchase of online pirated products. Second, laws and regulations on digital copyright protection are insufficient, and corresponding technical means for digital copyright protection are also lacking. Some researchers have proposed addressing digital

copyright protection issues from legal, technical, and industry self-management aspects, specifically including providing comprehensive legal protection from legislation to judiciary, establishing a collective organization management model, upgrading digital copyright protection technology, and innovating business models [10].

3.3 Research on Digital Publishing Talent Cultivation

In the process of facing challenges brought by digital transformation, publishing units' mastery of knowledge such as new media technology and the full digital publishing process has become an urgent task for practitioners in the digital publishing field. As important workers in the publishing industry, editors should actively transform their traditional thinking patterns when facing digital publishing, moving from a single dimension of text editing to multi-faceted development as composite digital publishing talents. Under the traditional publishing model, editors mainly processed and presented content. However, with the advancement of digital technology, editors' work content and methods, such as editing means, tools, and editing processes, have undergone transformation. Some researchers have pointed out that in the digital publishing environment, scientific journal editors need to understand new digital technologies, be familiar with new digital communication concepts, and learn multi-dimensionally about content that uses various digital technologies for professional academic publishing [11]. Regarding specific digital publishing technologies, editors should learn and understand content such as database retrieval technology, media processing technology, digital copyright protection technology, and digital publishing management systems. Some researchers have also proposed, from the perspective of university talent cultivation, that starting from the concept of big publishing education, interdisciplinary education should be actively promoted in training methods and curriculum design, teacher team construction should be continuously strengthened, flexible and diverse cooperative education models should be explored, and high-quality composite talents should be cultivated for the digital publishing industry [12].

3.4 Digital Publishing Research in the Context of Emerging Digital Technologies

In recent years, the application of emerging technologies such as big data, blockchain, artificial intelligence, and virtual reality has brought important opportunities for the development of the digital publishing industry. Some researchers have also conducted related research on digital publishing in the context of these technologies. Sun Yuling analyzed the development trends of the digital publishing industry in the big data era, believing that personalized content customization based on big data technology, precise push for different user groups, and other importance will become increasingly prominent, and the organizational structure, business processes, and business models of digital publishing-related enterprises will also continuously develop and change

[13]. With its characteristics of decentralization, immutability, collective maintenance, and smart contracts, blockchain technology is increasingly widely applied in the digital publishing field. Hua Jin and others conducted research on the application and development of blockchain technology in digital publishing from a comparative domestic and international perspective and proposed relevant countermeasures for addressing challenges in the application of blockchain technology in the digital publishing field [14]. Around 2017, artificial intelligence technology began to accelerate its entry into the digital publishing industry, and digital publishing institutions are continuously improving the intelligence level of product development and resource construction. Wang Hui and others elaborated on the current application status of artificial intelligence technology in educational publishing, mass publishing, and professional digital publishing platforms, and made prospects for its development trends in the digital publishing field [15].

This article uses bibliometric analysis methods and knowledge mapping visualization tools to comprehensively review digital publishing literature, present research achievements in this field, construct a knowledge map of the digital publishing research field, and summarize research hotspots and development 脉络 of digital publishing. High-attention research topics are summarized into four clusters: research on the conceptual connotation of digital publishing, research on digital transformation of traditional publishing, research on digital publishing talent cultivation, and digital publishing research in the context of emerging digital technologies, and research hotspots and important content of each cluster are reviewed. Through literature review and quantitative analysis, it was found that digital publishing research has diverse perspectives and continuously enriched content, laying a solid foundation for the digital publishing research field. From the perspective of research direction expansion, much research follows national macro-development themes and conducts comprehensive research on the digital publishing industry based on the digital economy. However, current academic research still has problems such as insufficient exploration of regularities in the digital publishing field, lack of focused vision and content deepening, and insufficient knowledge increment, which need to be addressed in future digital publishing research.

(To be continued on page 144)

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