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Research on Scholarly Publishing Based on Artificial Intelligence Environments

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ABSTRACT

With the rapid development of digital technology, the academic publishing field is facing transformation and challenges. This paper explores the impact of digital transformation on traditional publishers against the background of China's academic publishing market. By analyzing the development status of digital publishing and market trends, it puts forward the suggestion that traditional academic publishers should seize the opportunity of the integration of artificial intelligence and digital technology to accelerate digital transformation. In the current competitive digital publishing era, academic publishers should focus on both specialization and scaling to enhance their competitiveness and market position and promote the academic publishing field to intelligent and convergent development, so as to achieve the goal of long-term sustainable development.

KEYWORDS

Scholarly Publishing, Artificial Intelligence, Digital Publishing

1. INTRODUCTION

With the rapid development of digital technology and the iterative tide of artificial intelligence, the publishing industry is experiencing unprecedented transformation and challenges. In this context, academic publishing, as the main body of professional publishing, carries the important mission of national scientific and cultural development [1]. However, in the wave of digitization, the traditional academic publishing market can hardly be spared and faces new opportunities and challenges.

The booming development of mass publishing and educational publishing fields, as well as the impact of the wave of digitization on the traditional market players, highlights the urgency of digital transformation. The academic publishing sector, as one of the early success stories of digital transformation, still maintains its leading position in the industry despite the slowdown in digital revenue growth. However, in the face of the future of deepening influence of digital technology, the traditional main body of academic publishing needs to accelerate the deep integration with digital technology such as artificial intelligence, develop innovative business, and improve the level of digitization in order to maintain competitiveness and market position.

The purpose of this paper is to discuss the development trends and challenges of the academic publishing field in the digital era, and to propose that traditional academic publishers should seize the opportunity of digital transformation, promote intelligent and integrated development, and achieve the goal of long-term sustainable development. The research in this paper may provide some useful thoughts and suggestions for the future development of the academic publishing field.

2. THE STATUS OF THE THREE MAJOR MODERN PUBLISHING INDUSTRIES

2.1. Status of digital publishing in China

According to the Annual Report of China's Digital Publishing Industry 2022-2023 ("the Report"), the total revenue of China's digital publishing industry in 2022 amounted to RMB 1,358.699 billion, an increase of 6.46% over last year, with the overall scale of revenue showing a growth trend. Among them, the total revenues of mass publishing and educational publishing are extremely high, providing an economic foundation for the high-quality and integrated development of the publishing industry.

Table 1. Digital Publishing Industry Revenue, 2022 (in billions of RMB)

Categories	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Internet journal	12.15	14.3	15.85	17.5	20.1	21.38	23.08	24.53	28.47	29.51
eBook	38	45	49	52	54	56	58	62	66	69
Digital newspapers	11.6	10.5	9.6	9	8.6	8.3	8	7.5	6.7	6.4
Blog applications	15	33.2	11.8	45.3	77.13	115.3	117.7	116.3	151.56	132.08
Mobile publishing	579.6	784.9	1055.9	1399.9	1796.3	2007.4	2314.82	2448.36	415.7	463.52
Online game	718.4	869.4	888.8	827.85	884.9	791.1	713.83	635.28	2965.13	2658.84
Webtoon	22	38	44.2	155	178.9	180.8	171	238.7	293.4	330.94
Online education			180	251	1010	1330	2010	2573	2610	2620
Internet advertising	1096	1507	1897	2295	2957	3717	4341	4966	5435	6639.2
Digital music	43.6	52.4	55	61	85	103.5	124	710	790.68	637.5
Total	2540.35	3387.7	4403.85	5720.85	7071.93	8330.78	9881.43	11781.67	12762.64	13586.99

According to the data shown in Table. 1, the share of traditional publishers in the market share of the publishing industry has been greatly reduced.

With the popularization of mobile devices, digital reading and the rise of online literature, the mass publishing market is booming, IT companies enter, online literature, online games are developing rapidly, using their data, platforms and other advantages to occupy the "richest end" of the value chain, physical bookstores sales decline, the traditional online store also weak growth, traditional mass publishers Traditional mass publishers have been reduced to suppliers of raw materials at the bottom of the chain. Seizing the convergence development business of mass publishing, such as digital publishing and overseas copyright sales, although progress is slow, it is still a direction for traditional publishers to seek new growth points.

Educational publishing has a large market size and is directly affected by national education policies. For a long time, traditional education publishers have relied on policy support and the publication of textbooks and teaching aids to ensure a stable source of income to a certain extent. However, with the changes in national education policy and the entry of a large number of digital education enterprises into the education publishing market, traditional education publishing has been hit hard.

Many students and teachers have turned to online access to resources, for example, some large online course platforms such as China University MOOC (Mucous Class) and Homework Help provide courses that often include supporting learning materials, which are usually free or low-cost, posing competition to traditional teaching materials, and sales of traditional teaching materials have declined;

online education is able to provide more diversified and personalized educational support products at a lower cost, for example NetEase 100 Points, a personalized diagnostic tutoring platform product for primary and secondary school students. All these make traditional education brands lose in the same competition with online education brands. Traditional education publishers should accelerate their digital transformation and develop smart education learning service platforms, etc. through cooperation with technology companies in order to adapt to the trend of education informatization.

2.2. Status of China's scholarly publishing industry

Revenue from the digitization of traditional books and newspapers was reported to have increased by 3.7% year-on-year. The scarcity, high quality and high value-addedness of scholarly publishing content make their profit margins among the highest in the publishing industry. In addition, the digitization process of academic publishing relies on specific pathways, has high infrastructure requirements, and its content has broad international applicability.

In the wave of digital publishing, the academic publishing sector was the first and most successful to transition from paper to specialized databases and digital platforms and has the highest digitization "penetration rate" compared to mass and educational publishing. At the same time, the traditional publishers of academic publishing did not appear as mass publishing and educational publishing like competitors - digital era, academic presses, university presses and academic database providers and other traditional publishing institutions are still the main market.

However, the report shows that their digitized revenue is the lowest point of growth in the last three years. Compared to the other two publishing sectors, the academic sector was the first to start the digital transformation but is also the lowest revenue pulling segment by digital transformation today. At the same time, as the "magazine is a broken iPad" said, the digitization of academic publishing is mostly stuck in the electronic version of the paper book, the degree of digitization needs to be improved.

As an indispensable part of scientific research and even the national innovation system, academic publishing is the field that should follow the path of intelligent publishing and convergent publishing. Academic publishing traditional publishers as an important main body of the current market, should ensure that the field of specialization at the same time to promote the scale of academic publishing, digitization, mastering the artificial intelligence code, will be more able to stand out in the highly competitive digital publishing era.

3. CHALLENGES AND OPPORTUNITIES FOR DOMESTIC ACADEMIC PUBLISHING

3.1. Opportunities and challenges facing traditional market players in domestic academic publishing

(1) The importance of scholarly publishing in all sectors. Digital technology, which is characterized basically by the Internet, big data, artificial intelligence and blockchain, has brought human society into the digital era, and high-quality development has become the consensus of the whole country. China's digital publishing resonates with the country's social and economic development, and the country is also vigorously promoting the construction of digital China and a strong publishing country. In the first annual meeting of the China Publishing Association of Academic Publishing (2023), it is also clearly indicated that the publishing industry should closely follow the strategic plan of the 20th Party Congress to promote the high-quality development of academic publishing [2].

In the "Publishing Industry" 14th Five-Year Development Plan "document clearly pointed out that the country to launch a number of scientific and technological publishing excellence, speed up the construction of world-class journals, accelerate the formation of large-scale, strong strength of

scientific and technological journal publishing clusters and groups, with an eye to building the world's first-class science and technology journals, optimize scientific and technological journals to optimize the allocation of resources for the publication of journals. This creates a good transformation environment for the academic publishing industry, and also puts forward higher requirements, artificial intelligence will empower the first-class academic publishing.

(2) The impact of new technologies on the academic communication system. On the one hand, artificial intelligence has had an impact on the academic evaluation system and the publishing process. Rapid publishing and open distribution may lead to inconsistencies in the quality of peer review, while the transparency of online platforms may lead to a threat to the anonymity of the peer review process, which may affect the fairness of the review [3].

Big data analysis tools and cloud computing technology etc. Yes, it is possible to handle large amounts of data, but it may also lead to researchers being more inclined to choose hot topics, overly pursuing high citation rates and high impact factors, which may lead to a decline in the quality of research, and a lack of human resources for long-term and fundamental research.

On the other hand, digitization and Internet technologies have enabled the rapid dissemination of academic papers and data, and the maturity of social media platforms has led to the rise of academic social networks such as ResearchGate, which allows users to comment, discuss and share academic content, which promotes instant communication among scholars and increases the interactivity and diversity of academic exchanges, and creates the conditions for self-publishing for scholars, which creates a certain impact on the publisher market. Publishers market has created a certain impact.

(3) The impact of open access on academic publishing system. Open Access (Open Access, OA for short) is the free online opening of published academic materials, such as journal articles, allowing global scholars to use the network to access and reuse - so that more knowledge is open to global scholars and the general public. Open science has always been a governance hotspot in academia, and at the closing session of the International Year of Basic Sciences for Sustainable Development 2022-2023, experts in many fields shared CERN's policy on open scientific data, which has become a core topic of academic communication and discussion in the digital age.

Open Access is one of the items in the transformation of the general environment of the academic publishing market. "OA is not just an academic openness, it has long been a business model." The OA movement has prompted traditional publishers to start offering OA options as well, while also giving rise to new OA publishers, and the market structure has shifted as a result. Since open access journals generally do not charge subscription fees, but rather sustain their operations through article processing charges (APCs) paid by authors, the revenue structure of publishers has also changed. Some large publishers such as Elsevier and Springer are under pressure to transform and have had to choose to adapt to this trend by allowing authors to opt for open access publishing.

The business model and market structure of academic publishing have been transformed, and the traditional paper and other publishers of academic publishing should complete the transformation under conditions that ensure a fair and sustainable academic publishing environment.

Against the background of artificial intelligence and the digital era, the traditional market of domestic academic publishing is faced with various challenges such as technological adaptability, diversification of user needs, academic evaluation system and the three major categories mentioned above, and it is a period full of both challenges and opportunities for the academic publishing system.

3.2. Successful paradigms of different actors in the publishing market

3.2.1. Scholarly publishing models abroad.

Foreign academic journals have built a complete and convenient digital reading ecosystem for readers by creating APP and website platforms. For example, Springer Nature is a leading global academic

publisher with several academic journals and books. It provides a comprehensive library of academic resources through its online platform SpringerLink, which supports full-text search, personalized recommendations and social media sharing, etc.; the organization has also launched the mobile APP of Nature Research, which provides users with a convenient mobile access experience, including the latest research developments and personalized content recommendations.

However, it is clear that compared to the ecosystems in the field of smart devices such as Apple and Huawei, the ecosystem of academic publishing still has a lot of room for progress. This of course has to do with the fact that the professionalism and reading integrity of academic publishing lead to the impossibility of copying its mature model, but it also provides a direction that can be explored for the creation of its ecosystem.

Open Access provides access equity for readers, but also creates new publishing inequities for authors who cannot afford to publish. Cambridge University Press's scholarly publishing promotes model optimization practices on a number of fronts [4].

In journals, Cambridge University Press works with more than 2,000 academic institutions around the world to promote conversion agreements with significant success, which greatly mitigate the reduction of revenue due to open access; the Cambridge Open Equity Initiative directly helps authors in low- and middle-income countries and regions to publish open access papers for free. In the case of books, Cambridge's Flip its Open program supports a sustainable model of open access publishing: instead of putting authors under the monetary pressure of publishing a book, the book is published conventionally and then converted to open access online for a global audience once revenues reach a certain amount.

Cambridge University Press has many more open access strategies and is committed to finding a balanced publishing model for libraries that meets the growing publishing needs of researchers, a model that is worth learning from.

3.2.2. Digital integration in other areas of domestic publishing

The audiobook segment is one of the most successful demonstrations of digital transformation in mass publishing. The domestic audiobook industry started late but is developing rapidly. According to statistics, China's audiobook industry is growing rapidly at a high rate of 30% per year, with a market size of up to 9.5 billion yuan in 2020, and the number of users using it is growing at a rate of 19.6% per year, with the number of readers reaching up to 569 million [5]. Take Himalaya FM, the largest mobile audio platform in China, for example, the APP seizes the needs of people's fragmented reading and reading for visually impaired groups to create a series of high-quality audiobook publications, and adopts new digital technologies, such as artificial intelligence and big data, to optimize the content recommendation algorithm and improve the user experience.

The development of audiobooks not only enriches readers' reading mode and reading experience, but also promotes the construction and healthy development of the new ecology of reading for all in China. This is both a new situation of digital reading and a successful case of digital transformation of mass publishing.

At the beginning of 2023, the meta-universe craze was overshadowed by the ChatGPT, but it also brought the development of meta-universe into a rational stage. With the deepening understanding of meta-universe at home and abroad, the content system of meta-universe is accelerating to open up, and more and more participants will join in the creation of digital content of meta-universe. In the field of educational publishing, there is also a combination of the two.

As a relatively new field, "Metaverse + Educational Publishing" can have very many innovative integration points in the field of educational publishing. It can promote the transformation from graphic editing to all-media editing. For example, if editors master VR technology, they can design virtual reality scenes according to the content of the book, so that the audience can have a stronger sense of interaction and experience the content of the book in an immersive, audio-visual combination.

Shanghai Open University utilizes MR (Mixed Reality) technology to create an immersive learning space, develops mechanical assembly courses, transfers knowledge from books to the virtual world, simulates virtual assembly of machinery through virtual simulation models and human-computer interaction, helps students quickly understand the internal structure and use of equipment, and improves the quality and efficiency of training.

4. ARTIFICIAL INTELLIGENCE ENABLES THE TRANSFORMATION OF TRADITIONAL MARKET PLAYERS IN ACADEMIC PUBLISHING

Digital publishing and convergent publishing are an emerging industry in the development of the publishing industry, and various publishing sub-industries have realized multi-dimensional digital reproduction of content through various technological means, while the transformation of academic publishing in general still lacks integration and planning, and lags behind the digitization of mass publishing and educational publishing to a certain extent. The use of artificial intelligence technology to accelerate the penetration of the academic publishing industry can further optimize the digitization of academic publishing, provide more feasible solutions for the traditional market players of academic publishing, and bring more possibilities.

4.1. Demand analysis of the digital scholarly publishing market

Digital scholarly publishing is undergoing a fundamental change from product-oriented to service-oriented.

We can find that researchers and scholars are no longer just looking for a single book or article, but are increasingly seeking personalized content recommendations, seamless cross-platform access, powerful data management and analysis tools, and platforms that support collaborative research. The open access trend is also prompting academic publishers to offer more flexible rights management to accommodate globalized scholarly communication.

In addition, with the rise of education and training services, scholarly publishers are beginning to offer online courses and seminars to meet the demand for continuous learning. The increase in these services, coupled with the need for efficient rights and licensing management and a focus on user support and community building, have combined to drive the transformation of the digital scholarly publishing market from a pure content provider to a comprehensive scholarly solutions provider.

4.2. Empowered by artificial intelligence

4.2.1. Decisional AI and generative AI enablement

Artificial Intelligence (AI) is mainly divided into decision-making AI and generative AI. Decision-making AI has been developed quite maturely in the commercial field, but its application in the field of scholarly publishing is rare. Make full use of the two types of AI to empower the digital transformation of scholarly publishing.

As shown in Figure 1, decision-making AI can improve the quality and efficiency of decision-making in academic publishing. At present, most of the papers are reviewed by the peer review system, and the review efficiency is low. Decision-making AI can support the peer review process by assessing the relevance, innovativeness, and citation potential of papers in order to optimize the selection and review process of papers; at the same time, by analyzing past review records, AI can predict the speed and quality of reviewers' reviews, rate them, and provide recommendation lists for academic publishers when selecting reviews, simplifying the publisher's screening process and improving reviewing Efficiency - This can minimize the possibility of intentional delays in peer review, but also reduce the challenge to the "multiple submission" ban, the review of the speed of the natural solution. Through the use of machine learning and big data analysis, decision-making AI can help publishers

screen out works with high research value and impact among the many papers submitted, help analyze research trends, and predict the popularity of a particular topic or paper, thus guiding editing and publishing strategies.

In practical applications, discriminative AI needs to be combined with the judgment of human experts to ensure accurate and ethical decision-making. At the same time, the application of AI needs to take into account legal and ethical issues such as copyright, privacy and data security. With the continuous progress of technology, the application of discriminative AI in the field of academic publishing will be more extensive and in-depth.

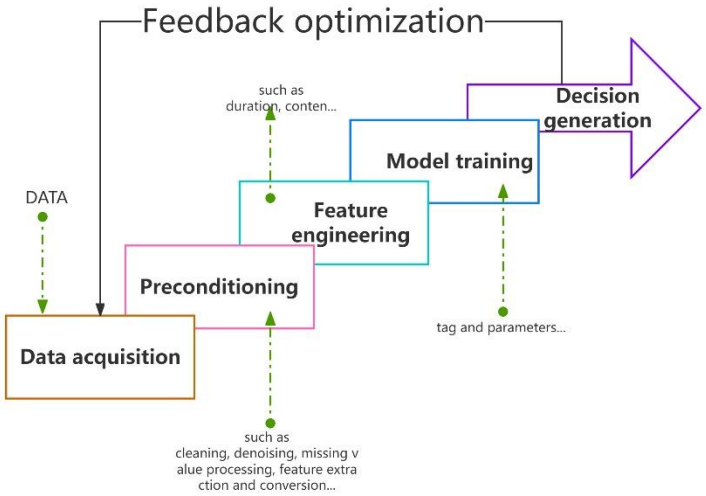

Figure 1. Decision-making AI

The application of generative AI in academic publishing is more focused on content creation and processing. As shown in Figure 2, utilizing natural language processing (NLP) technology, generative AI can automatically write abstracts, generate research reports, and even assist in constructing drafts of research papers. For example, AI can extract key information from a large body of literature to help researchers quickly prepare a literature review. In addition, these AI tools are also able to translate text, making research results more accessible to a global audience across language barriers.

When applying generative AI, the field of academic publishing needs to consider ethical and legal issues to ensure that AI-generated content does not infringe on copyright, does not mislead readers, and respects the originality and intellectual property rights of authors. In addition, AI-generated content should be transparently labeled so that readers know the source of the content. As the technology matures and norms are established, generative AI is expected to play a greater role in academic publishing.

Decision-making AI helps publishers accurately grasp academic trends, generative AI assists scholars in efficient academic writing and data integration, and the two types of AI complement each other, so that in the future, academic publishing will become more automated and personalized, the publishing process will be more streamlined, and the quality and accessibility of academic research will be further enhanced [6].

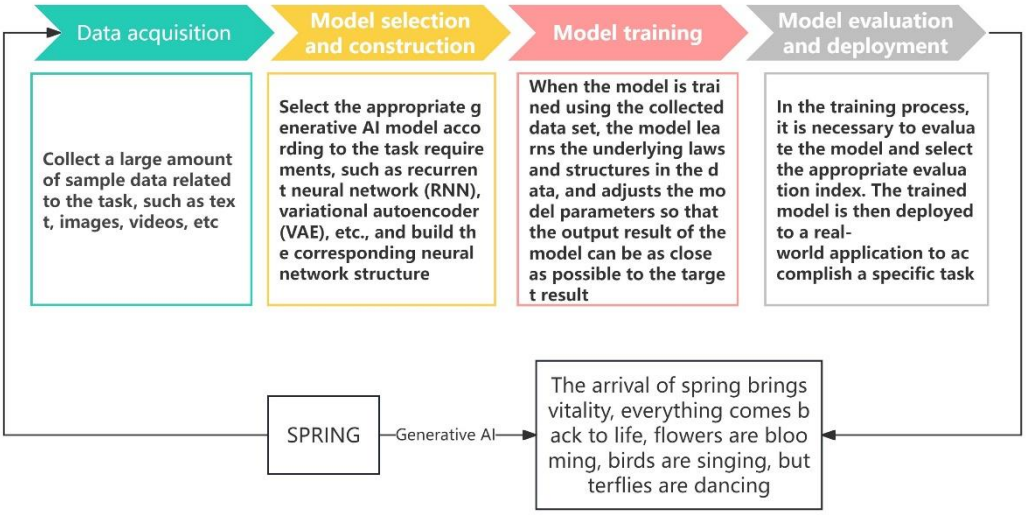

Figure 2. Generative AI

4.3. Artificial intelligence + 5G + blockchain" combination punch

In the contemporary era of rapid digitalization, Artificial Intelligence (AI), 5G communication technology and blockchain technology are becoming important drivers of change in all areas of society. In the field of academic publishing, the combination of these three not only injects new vitality and innovation, but also brings brand new possibilities for the dissemination, management and evaluation of academic research.

The efficiency and accuracy of academic information retrieval can be significantly improved by an intelligent academic search and recommendation system, combined with AI and 5G technologies. At the same time, the application of blockchain technology realizes the decentralization of academic publishing, reduces the dependence on intermediaries, and improves transparency and credibility. In addition, the smart contract mechanism in blockchain brings fairness and transparency to the distribution of revenues in academic publishing and ensures the rights and interests of authors, and the high-speed transmission and low-latency characteristics of 5G technology also help the rapid dissemination of multimedia content, which makes academic communication more three-dimensional. Finally, combining the data analysis capability of AI and the data security of blockchain, the field of academic publishing encourages more open data sharing and cooperation, and promotes the common development of scientific research results.

The combination of "AI+5G+Blockchain" shows great potential in the field of academic publishing and promotes academic publishing to move towards a new era of smarter, decentralized, fair and efficient, which is a positive direction for academic publishing institutions and researchers to explore and utilize [7].

5. CONCLUSIONS

In order to take into account the progress of digital technology and humanistic rationality, and to fulfill the responsibility of a great nation, China's publishing industry needs to pay attention to the functional status of academic publishing, and academic publishers need to give full play to their role in the academic community, give full play to their professionalism and authoritative functions, rationally identify their contents and make good use of their roles under the environment of artificial intelligence, and promote the digital upgrading of academic publishing under the mode of "AI+5G+Blockchain Under the mode of "AI+5G+Blockchain", we will promote the digitalization

and upgrading of academic publishing, and then enhance the digital discourse power of Chinese academic publishing.

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