

PERSPECTIVE AND INSIGHT

Artificial intelligence-driven scholarly journal publishing: A new milestone in the modernization of science

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The origins of academic journal publishing date back to 1665 with the founding of *Philosophical Transactions* by the Royal Society of London,^[1] a history of approximately 360 years. Over time, academic journals have become the most established and effective medium for disseminating and sharing scholarly achievements. They provide researchers with essential resources to acquire knowledge, follow advancements, and track the frontiers of their fields. They also serve as platforms for publishing scientific findings, quality assessments, and ensuring intellectual property rights, as well as fostering the widespread dissemination and timely transformation of scientific discoveries into real-world applications.

Over this 360-year journey, the academic journal publishing industry has mirrored the evolution of other societal and industrial activities worldwide, undergoing a "modernization process" characterized by transitions from traditional to modern, simple to complex, slow to efficient, and dispersed to centralized. This process began with a cottage-industry organizational model and can broadly be divided into the stages of industrialization, informatization, digitization, integration, and the current stage: intelligence.

LOOKING BACK: MARKET AND TECHNOLOGY AS DUAL PILLARS OF GROWTH

Historically, two primary drivers underpinned the development of the global journal publishing industry: market demand and technological advancements.

On one hand, the ever-growing market provided space for academic journal publishing to flourish. This market has closely followed the global increase in science and technology investment.^[2] Scientific research is widely acknowledged as the core engine of societal progress, resulting in increased attention and funding for R&D activities. The expanding scale of global R&D investment inevitably drives the growth of scientific outputs. Furthermore, the development of research-related fields has bolstered science education, continuously supplying young researchers to the academic community and expanding the pool of journal contributors. In the context of open-access publishing models, this growing market can also be seen as a widening audience base.

On the other hand, technological advancements have driven each phase of modernization in academic journal publishing.

The industrialization stage

Marked by the adoption of technologies like laser typesetting and high-quality printing, this stage bid farewell to the "lead and fire" era and welcomed "light and electricity". These innovations significantly enhanced the quality and presentation of print journals, catering to an expanding author base.^[3]

The informatization stage

Triggered by the proliferation of computers, tools like email and software systems streamlined content organization and peer review, bringing journals and authors closer together.^[4]

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The digitization stage

With the rise of the internet, academic content production and dissemination embraced online submission systems and digital production platforms. This stage transformed the primary distribution channels from printed subscriptions to digital formats accessible *via* the internet.^[5]

The integration stage

Building on the growth of mobile internet and the "internet mindset", this stage fostered new organizational models and applications. Innovations like article-level publishing, integrated publishing, extended publishing, and knowledge reorganization emerged.^[6]

A NEW ERA: ARTIFICIAL INTELLIGENCE (AI)-POWERED ACADEMIC PUBLISHING

Today, the application of is propelling the academic publishing industry into a new phase: the intelligence era. AI technologies are enabling functions like precision recommendations, intelligent Q&A systems, automated resource allocation, user behavior analysis, knowledge extraction, content analysis, and automatic generation.^[7] These capabilities are reshaping the workflows and foundational logic of academic publishing. Coupled with the principles of open science, AI is driving exploration into new publishing paradigms, such as preprints, data publishing, registered reports, laboratory publishing, open peer review, and centralized peer review. These innovations are challenging traditional norms and practices in academic publishing.^[8]

However, despite the transformative potential of AI, its application in academic publishing is far from mature. Issues of content reliability and ethical integrity, along with unforeseen risks, present significant challenges.^[9] The scientific community generally views AI as a tool to enhance personal efficiency and alleviate researchers from time-consuming, low-creativity tasks. For instance, a survey conducted by *Nature* revealed that authors most desired AI tools to help non-native English speakers overcome language barriers.^[10]

OPPORTUNITIES AND CHALLENGES IN THE INTELLIGENT ERA

As we stand on the cusp of this AI-driven revolution, it truly feels like "the best of times, and the worst of times" (*A Tale of Two Cities*). The intelligent publishing era brings both opportunities and challenges. We urge professionals in the journal publishing industry to embrace this new stage proactively, exploring AI applications while staying committed to the original mission of

academic publishing: to preserve human civilization, celebrate scientific discovery, and drive technological advancement.

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