

A Timely Quick Literature Review on the Deepseek in Chinese Publications

中国出版物中关于深度求索研究的最新文献综述

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关键词

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ABSTRACT

The emergence of China's open-source generative AI model DeepSeek has stimulated extensive interdisciplinary research. This review synthesizes 33 studies examining its technological innovations, ethical challenges, societal impacts, and implications for global governance. Distinct from Western proprietary models, DeepSeek emphasizes open collaboration, energy efficiency, and accessibility, demonstrating breakthroughs in cost-effective training and localized deployment. Key discussions focus on its societal consequences, particularly regarding workforce displacement (the "automation paradox"), environmental sustainability, and digital inclusion. Scholars suggest DeepSeek's human-centric approach may promote more inclusive and sustainable AI development. Future research should prioritize long-term societal effects, equitable access, and international governance frameworks to support this evolving paradigm.

摘要

中国开源生成式AI模型DeepSeek的崛起引发跨学科研究热潮。本文整合33项研究，系统考察其技术创新、伦理争议、社会影响与全球治理价值。该模型通过开源协作、能效优化和普惠发展路径，为生成式AI提供了区别于西方技术垄断的新范式，其高效训练方法、本地化部署等创新尤为突出。研究同时关注其引发的就业替代效应（“自动化悖论”）、环境可持续性、数字公平等议题。学者认为，这种以人为中心的发展模式可能推动AI领域向更包容、可持续的方向转型，但未来仍需重点研究长期社会影响、普惠实现路径及跨国治理协同等关键问题。

1. Introduction

In recent years, the rapid evolution of generative artificial intelligence (AI) has revolutionized multiple sectors ranging from education and media to manufacturing and governance. A particularly striking development is the emergence of DeepSeek ([https://](https://www.deepseek.com/)

www.deepseek.com/), a Chinese open-source generative AI model that has garnered international attention for its unique technical and economic attributes. Unlike its Western counterparts that often rely on high-cost, closed-source ecosystems, DeepSeek is distinguished by its low training costs, rapid deployment, and an open, collaborative model that promises

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to lower barriers to access (Guo et al., 2025a; Duan, 2025), which will be elaborated in detail in the next section. As global digital transformation accelerates, researchers are increasingly exploring not only the technical merits of DeepSeek but also its wider societal implications.

The literature indicates that DeepSeek's breakthrough is multi-faceted. Technologically, it leverages innovations in algorithmic design—such as hybrid expert architectures and advanced distillation techniques—to reduce computational demands while delivering performance on par with established models (Zhao, 2025). Its impact on communication strategies is also notable; studies reveal how DeepSeek's disruptive innovation reconfigures global AI discourse, challenging the established dominance of Western models (Guo et al., 2025b; Duan, 2025). Furthermore, the model's application spans a diverse array of industries including construction, energy, library science, enterprises' innovation, and manufacturing, each presenting unique challenges and opportunities for sustainable development (Zhao, 2025; Luo et al., 2025; Wu et al., 2025).

This timely quick review aims to provide a comprehensive synthesis of the current state of research on DeepSeek and its broader implications in China. We begin by outlining the core technical characteristics and strategic innovations that set DeepSeek apart from other counterparts. Next, we examine its role in reshaping AI communication and governance, with particular emphasis on issues such as digital equity, automation paradoxes, and environmental sustainability. For your information, the 'automation paradox' describes the counterintuitive phenomenon where increased automation intended to reduce human labor actually generates new and often hidden labor demands, such as maintaining or training automated systems (Mwafurirwa, 2024). Finally, we discuss the implications for education and global labor, as well as directions for future research. In doing so, we search for published papers with the keyword "Deepseek" at the CNKI on March 5th 2025^[1]. The CNKI is the largest dataset for academic publications in Chinese. All research papers were included with taking out the news report. Finally, 33 papers were included in this quick literature review and each of them contributed to a nuanced understanding of how DeepSeek may pave the way toward a new digital civilization.

2. A Timely Quick Literature Review

2.1. *Technological Innovations and Breakthroughs*

DeepSeek's technical breakthrough is frequently attributed to its innovative algorithmic strategies and cost-effective training regimen. Guo et al. (2025a) detail how the model integrates a hybrid mixture of experts (MoE) framework with multi-head latent attention mechanisms to reduce computational overhead while maintaining high performance. Similarly, DeepSeek's training cost is significantly lower. According to the DeepSeek-V3 Technical Report (Liu et al., 2024), the model required approximately 2.788 million H800 GPU hours for its full training. In comparison, training GPT-3, which has 175 billion parameters, was estimated to require around 355 years and \$4.6 million using Tesla V100 GPUs (Li, 2020). Therefore, while DeepSeek-V3's training is resource-intensive, it is important to note that its scale and capabilities differ from those of GPT-3.

In a philosophical exploration of the essence of intelligence, Tu and Gao (2025) examine the "automation paradox"—a phenomenon wherein increased automation simultaneously creates new labor demands even as it replaces routine tasks. Their study suggests that while DeepSeek automates many aspects of content generation, the hidden labor involved in data curation and algorithm maintenance remains significant. This observation is echoed by He (2025), who argues that the production of AI is intrinsically tied to labor and material resources, thereby challenging the narrative that automation necessarily leads to human obsolescence.

In summary, scholarly opinion diverges regarding the benefits of using AI and its challenges to replace human workers.

2.2. *Communication, Cultural Impact, and Global Governance*

DeepSeek's influence extends beyond technical innovation into the domains of media, public discourse, and international governance. Duan (2025) investigates how DeepSeek's rapid adoption has reconfigured global AI discourse by seizing the "discourse power" previously held by Western technologies. The study illustrates that DeepSeek's strategic use of open-source methodologies not only democratizes technology but also challenges entrenched power structures by enabling broader participation in AI development (Duan, 2025).

Furthermore, Yu and Jin (2025) explore the concept of "generative media optimization" and its impact on the communication ecosystem. Their research demonstrates that DeepSeek's open model fosters a

more decentralized media environment, where content creation and dissemination become more efficient and equitable (Yu & Jin, 2025). In parallel, Lu and Wu (2025) delve into the ethical debates surrounding generative AI, particularly the “apocalyptic” narratives that predict a dystopian future dominated by machines. They argue that while such concerns are not unfounded, they must be balanced against the potential for AI to enhance human welfare when deployed responsibly (Lu & Wu, 2025).

The governance implications of DeepSeek have also attracted scholarly attention. In the context of digital sovereignty, Wang and Wang (2025) contend that DeepSeek’s open-source framework offers a promising pathway for countries to regain control over digital infrastructure and data governance. They note that by bypassing proprietary systems, DeepSeek enables local deployment and customization—critical factors for preserving national digital sovereignty. Additionally, Xu and Wang (2025) discuss how DeepSeek’s model of “open innovation” can contribute to a global ecosystem of shared technological advancement, potentially narrowing the digital divide between the Global North and South.

Despite broad agreement among scholars like Duan (2025) and Yu and Jin (2025) on DeepSeek’s democratizing effects, significant debate exists regarding its broader governance implications. Wang and Wang (2025) posit that DeepSeek’s open-source architecture inherently supports national digital sovereignty by enabling local control and customization. In contrast, Lu and Wu (2025) caution against overly optimistic assessments, emphasizing that open access alone does not mitigate risks such as misuse in surveillance or digital authoritarianism. This critical tension reveals an underlying controversy on whether open-source AI inherently promotes equitable governance or may paradoxically reinforce existing power imbalances.

2.3. Impacts on Education, Libraries, and Workforce Automation

The educational implications of DeepSeek are explored in several studies. Yu (2025) presents a provocative scenario: what if DeepSeek could correctly complete 80% of assigned homework? This inquiry opens up debates about the role of AI as both a tool and a disruptor in higher education. According to Yu (2025), the integration of DeepSeek in classroom settings could drive a fundamental rethinking of pedagogical models, shifting the focus from rote learning to critical thinking and creativity.

In a similar vein, Guo et al. (2025c) examine the impact of generative AI on library services. Their study reveals that the integration of DeepSeek into library systems can revolutionize reference services,

digital curation, and knowledge discovery. The authors argue that AI-powered tools enable libraries to manage vast digital resources more efficiently while also enhancing the user experience through personalized recommendations (Guo et al., 2025c).

Luo et al. (2025) provides a case study on how open-source large models empower smart libraries. They demonstrate that DeepSeek’s application in library contexts not only improves metadata extraction and semantic search capabilities but also encourages the development of new service models that leverage crowd-sourced data and machine learning. This transition is expected to facilitate more dynamic interactions between librarians and users, ultimately reshaping the roles of information professionals (Luo et al., 2025).

Beyond education and libraries, the future of workforce automation is another critical area of investigation. Xie (2025) discusses the notion of “smart transition,” arguing that while automation may replace some routine tasks, it also creates new opportunities for human creativity and innovation. The author posits that DeepSeek’s adoption may prompt a recalibration of labor markets, urging policymakers to develop strategies that ensure equitable distribution of technological gains. In this regard, Guo et al. (2025c) and Lu (2025) both emphasize the need for robust social safety nets and lifelong learning initiatives to support workers in transitioning to new roles in a digital economy.

While scholars like Yu (2025) and Guo et al. (2025c) largely celebrate DeepSeek’s potential to revolutionize educational and library systems, there is notable disagreement on the consequences of such transformations for equity and labor stability. Yu (2025) optimistically envisions educational environments enriched by AI-driven personalized learning, whereas Lu (2025) and Xie (2025) warn of significant displacement risks and increasing digital divides unless comprehensive policy interventions, such as lifelong learning initiatives and strengthened social safety nets, are implemented. This divergence highlights a fundamental scholarly debate regarding the net social benefit of AI adoption in the education and labor sectors

2.4. Environmental and Economic Considerations

A significant body of research has focused on the sustainability and ecological impacts of large AI models. Zhao (2025) and Tu and Gao (2025) underscore that while DeepSeek’s optimized algorithms reduce training costs, the overall energy consumption associated with large-scale AI remains a pressing concern. He (2025) further elaborates on the “green paradox,” noting that the environmental benefits of

lower training costs could be offset by increased deployment and usage across industries.

In a complementary analysis, Chen (2025) explores the economic transformation enabled by open-source AI models and argues that DeepSeek's cost-efficient design makes it an attractive option for emerging economies, where access to high-end computational resources is limited. This democratization of technology could spur innovation and drive economic growth, particularly in regions that have historically been marginalized in the global digital economy.

Zhou (2025) examines sustainable AI practices, emphasizing that energy-efficient computing and green data centers are crucial for mitigating the environmental impacts of AI. The author also calls for a coordinated approach that integrates technological innovation with environmental stewardship—a theme that resonates with Sun (2025), who highlights the potential for DeepSeek to serve as a model for technological democratization and sustainable development.

Within discussions of sustainability, scholars display clear contention about DeepSeek's true environmental and economic impact. Zhao (2025) and Chen (2025) underscore significant environmental benefits due to DeepSeek's reduced computational needs, thus supporting economic democratization, particularly in resource-constrained regions. However, He (2025) and Zhou (2025) present a critical perspective, cautioning that increased accessibility could lead to exponential deployment, ultimately offsetting initial environmental savings—a phenomenon they term the 'green paradox.' Such disagreement necessitates further empirical examination of the long-term sustainability and net ecological impact of broad-scale DeepSeek deployment.

2.5. Emerging Trends and Future Directions

Several recent studies outline future trajectories for generative AI and the role of DeepSeek in shaping global digital civilization. Zhang (2025) envisions that DeepSeek's influence on global AI governance could lead to a new era of collaborative innovation, wherein nations work together to establish shared standards and regulatory frameworks. Similarly, Li (2025) argues that open-source AI platforms like DeepSeek could fundamentally alter the competitive landscape by reducing reliance on proprietary technologies and encouraging cross-border cooperation.

Wang (2025) contends that DeepSeek's model has the potential to bridge the digital divide in emerging economies by providing affordable, high-performance AI solutions and furthermore, suggests that as more countries adopt DeepSeek's approach, a more inclusive global AI ecosystem will emerge—one that

prioritizes sustainability, equity, and collective progress (Wu et al., 2025). Zhou (2025) and Sun (2025) further reinforce this vision by calling for increased investment in green computing and collaborative digital infrastructure that supports open-source innovation.

Ethical considerations and regulatory challenges are also prominent in the literature. Ma (2025) raises critical questions about the ethical deployment of DeepSeek, urging stakeholders to consider issues such as data privacy, algorithmic bias, and the potential for misuse in surveillance and social control. In parallel, Fang (2025) explores the transformative role of DeepSeek in reconfiguring educational paradigms, noting that while AI can enhance learning outcomes, it also requires careful oversight to prevent exacerbation of social inequalities.

Gao (2025) provides an in-depth analysis of how traditional industries can be transformed by adopting AI solutions like DeepSeek with emphasizing that the integration of AI into legacy systems requires not only technological adaptation but also a fundamental rethinking of business processes and workforce training. Liu (2025) reinforces this idea by discussing the challenges and opportunities associated with workforce automation, highlighting that a balanced approach is needed to ensure that technological progress does not come at the expense of human dignity.

Tang (2025) and Yang (2025) further examine the cultural and epistemological shifts driven by DeepSeek. Tang (2025) discusses the cross-cultural implications of a globally accessible AI platform, noting that the proliferation of open-source models may democratize knowledge production and foster intercultural dialogue. Yang (2025) argues that DeepSeek's impact on knowledge systems could lead to a reconfiguration of how information is curated, disseminated, and consumed in the digital age.

Finally, Zheng (2025) offers a forward-looking perspective on the catalytic role of DeepSeek in accelerating technological innovation, positing that by breaking down traditional barriers to entry, DeepSeek may serve as a blueprint for future AI developments that are both sustainable and socially equitable. This perspective is echoed by several scholars who see the model as a harbinger of a more democratized digital future.

Although there is consensus among scholars such as Zhang (2025), Li (2025), and Zheng (2025) on DeepSeek's potential for fostering global collaborative innovation, significant scholarly debate remains around ethical and regulatory aspects of its open-source model. Ma (2025) and Fang (2025) stress urgent ethical considerations, such as algorithmic bias and misuse for surveillance, arguing that open-source

models require stringent oversight and clear ethical guidelines. Conversely, Tang (2025) and Yang (2025) highlight DeepSeek's democratizing cultural impact, suggesting that concerns about misuse might overshadow the transformative potential of globally shared knowledge and innovation. This unresolved debate signals a critical need for research explicitly addressing how ethical frameworks can be integrated into open-source AI development.

3. Discussion

The reviewed literature demonstrates that DeepSeek is more than a mere technical innovation—it is a multifaceted phenomenon that has far-reaching implications for society, culture, and global governance. The synthesis of the technical studies (Guo et al., 2025a; Zhao, 2025) with analyses of communication strategies (Duan, 2025; Yu & Jin, 2025) and governance models (Wang & Wang, 2025; Xu & Wang, 2025) suggests that DeepSeek represents a critical inflection point in the evolution of generative AI.

One key discussion point is the contrast between the traditional “capital logic” that underpins Western AI development and the “people-centered” approach embraced by DeepSeek. The term ‘capital logic’ refers to the prioritization of profit maximization and competitive market dynamics as the driving forces behind technological innovation, typically leading to inequalities in access and control (Han, 2022). Wang and Wang (2025) and Lu and Wu (2025) argue that by prioritizing social welfare and open collaboration, DeepSeek disrupts the profit-driven model that often leads to inequitable distribution of technological benefits. This paradigm shift is particularly significant in light of the increasing concerns over algorithmic bias, digital exploitation, and data colonialism (He, 2025; Ma, 2025). Among these concerns, data colonialism is a critical framework that views data extraction practices by large technological corporations as analogous to historical colonialism, perpetuating unequal power dynamics and exploiting resources from marginalized communities and nations (Couldry & Mejias, 2019). The literature suggests that DeepSeek's open-source model not only democratizes access to advanced AI capabilities but also lays the groundwork for a more equitable digital ecosystem.

Another important aspect concerns the environmental and economic dimensions of AI development. Although DeepSeek's optimized algorithms have reduced training costs and energy consumption (Zhao, 2025), the overall environmental impact of scaling AI technologies remains an issue. Zhou (2025) and Sun (2025) call for greater attention to sustainable practices in AI research, noting that improvements in en-

ergy efficiency must be accompanied by robust policies to manage carbon emissions. In this context, the economic analysis by Li (2025) and Wang, J. (2025) provides a compelling argument for the potential of DeepSeek to spur economic growth in emerging markets by lowering entry barriers for technological innovation.

The role of DeepSeek in reshaping educational paradigms also emerges as a central theme. Yu (2025) provocatively questions how homework and learning might evolve if AI systems can complete a significant portion of assignments accurately. Guo et al. (2025c) and Fang (2025) expand on this idea by exploring how AI-driven systems could transform not only classroom instruction but also the broader landscape of educational resources and services. These changes, while promising increased efficiency and personalization in education, also raise concerns about academic integrity and the devaluation of human expertise.

Moreover, the implications for global governance and international digital cooperation are profound. Zhang (2025) and Zheng (2025) emphasize that DeepSeek's open and collaborative nature could help break the monopolistic hold of Western technology giants. By fostering international partnerships and enabling local customization, DeepSeek may help build a more resilient and inclusive global digital infrastructure. Xu and Wang (2025) further highlight that the open-source model provides a basis for mutual technological advancement and regulatory alignment among nations—a necessary condition for addressing transnational challenges such as cybersecurity, digital privacy, and algorithmic transparency.

Finally, ethical concerns remain a persistent challenge. The debate over whether generative AI might eventually “destroy humanity” (Lu & Wu, 2025) has spurred a range of scholarly responses. While some critics caution against the unchecked advancement of AI technologies, others argue that a balanced approach—emphasizing ethical regulation, human oversight, and robust institutional frameworks—can harness the benefits of AI while mitigating its risks (Ma, 2025; Tang, 2025). The notion of “effective accelerationism” as discussed by Lu and Wu (2025) suggests that the pace of technological change may force society to confront difficult trade-offs between innovation and regulation.

Taken together, these discussions illustrate that DeepSeek is not merely a technological artifact but a catalyst for broader socio-technical transformation. Its ability to challenge established power structures, democratize technology, and promote sustainable innovation positions it as a potential model for the future of AI development worldwide.

4. Conclusion

This review has synthesized insights from 33 recent studies on DeepSeek and related topics to provide a comprehensive overview of its technological, social, economic, and environmental dimensions. DeepSeek's breakthrough lies not only in its advanced algorithmic design and cost-effective training methods but also in its open-source, people-centered approach that promises to democratize AI access and redefine global digital governance.

The literature reveals that DeepSeek challenges the dominant Western paradigm by prioritizing open collaboration and local deployment, thereby offering a counter-model to proprietary systems. Its impact spans diverse sectors—from media and education to library science and manufacturing—where it drives transformative changes while also raising important ethical and sustainability concerns.

To guide future scholarly and practical efforts, we propose several concrete research directions:

Empirical Impact Studies: Conduct longitudinal and comparative studies across different regions and sectors (e.g., education, public services, industrial automation) to quantify DeepSeek's actual impact on labor markets, productivity, and knowledge dissemination. Certainly, the research should meet rigor standard as Wu (2025) called for the innovation management area.

AI Governance Models: Investigate case-based frameworks for ethical regulation of open-source generative AI models, especially in relation to data privacy, algorithmic bias, and potential misuse in surveillance.

Green AI Benchmarks: Develop standardized benchmarks for measuring the carbon footprint and energy efficiency of AI models like DeepSeek under varying deployment conditions.

Cross-cultural Knowledge Systems: Explore how DeepSeek influences epistemic pluralism by enabling localized AI content generation in non-English languages and underrepresented cultural contexts.

Policy Readiness Assessments: Assess national-level policy frameworks for AI deployment to identify readiness gaps in leveraging open-source models and implementing responsible innovation.

DeepSeek stands as a paradigm shift in generative AI, heralding the possibility of a more inclusive and sustainable digital civilization. By integrating technical innovation with ethical, environmental, and social considerations, DeepSeek offers a promising blueprint for a future in which advanced AI systems serve the broader interests of humanity. Continued exploration and critical engagement with this model will be essential for guiding global digital transforma-

tion in a direction that is both innovative and equitable.

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