The Mechanism, Dilemma and Improvement Path of AI Empowering the High-quality Development of Rural Tourism

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Abstract

Against the backdrop of digital rural development and the deep integration of culture and tourism, artificial intelligence (AI) has become a key driver of the transformation and upgrading of rural tourism. Compared with the traditional extensive development model, AI promotes rural tourism through data-driven, scenario-based, and governance-oriented approaches. It effectively restructures rural tourism business formats, optimizes tourist service experience, improves industrial governance efficiency and revitalizes local cultural heritage, injecting new momentum into the quality improvement and efficiency enhancement of rural tourism.

At present, the application of AI in China's rural tourism is still in its initial stage. A host of challenges including inadequate digital infrastructure, superficial technical application, low digitalization of cultural and tourism resources, and shortages of interdisciplinary talents have hindered the in-depth integration between intelligent technologies and rural tourism.

In view of the above issues, this paper systematically expounds the internal mechanism of AI enabling the high-quality development of rural tourism from the perspectives of industry, service and governance, and analyzes the prominent difficulties in practical development. It further puts forward optimization strategies in terms of technical adaptation, resource revitalization and talent cultivation. The research aims to promote the digital, intelligent and distinctive development of rural tourism, and contribute to the comprehensive revitalization of rural areas.

Keywords AI; Rural Tourism; High-Quality Development; Digital Empowerment; Rural Revitalization

1 Introduction

New-generation information technologies represented by AI are rapidly penetrating into agriculture and rural areas, providing technical support and innovative approaches for rural tourism to overcome development bottlenecks and realize digital transformation. Through data-driven operation, scenario reconstruction and intelligent governance, AI can deeply boost industrial upgrading, service optimization and cultural revitalization, serving as a core driving force for the high-quality development of rural tourism.

Nevertheless, prominent problems persist in practical implementation, including inadequate digital infrastructure in rural areas, slow digitalization of cultural and tourism resources, and a severe shortage of interdisciplinary talents. The poor compatibility between technologies and industries, as well as between talents and market demands, has hampered the in-depth integration of AI and rural tourism.

Against this backdrop, this paper systematically explores the internal mechanism of AI empowering rural tourism, identifies practical obstacles and underlying difficulties, and proposes improvement strategies from the perspectives of technical adaptation, resource revitalization and talent cultivation. It intends to offer theoretical reference and practical guidance for the intelligent, distinctive and sustainable development of rural tourism, and facilitate the construction of digital countryside and comprehensive rural revitalization.

2 Internal Mechanism of AI Empowering the High-quality Development of Rural Tourism

Combining domestic and foreign research findings and practical explorations, the internal mechanism of AI empowering the high-quality development of rural tourism can be summarized into three mutually supportive and coordinated dimensions:industrial empowerment, service empowerment and cultural empowerment. Corresponding to the industrial supply side, tourist demand side and characteristic core side respectively, they jointly form a three-in-one intelligent empowerment system.

2.1 Industrial Empowerment: Reshaping Rural Tourism Formats and Promoting Industrial Quality Improvement and Upgrading

AI, through technological embedding and data-driven approaches, deeply reconstructs the structure and operation modes of rural tourism formats, promoting its transformation from traditional sightseeing-oriented tourism to composite experience-oriented tourism, and from decentralized operation to coordinated development.

From the perspective of the industrial chain, AI technologies such as intelligent recognition and data mining enable automatic classification and value evaluation of rural natural landscapes, agricultural resources, folk activities and other elements, assisting developers in rapidly creating tourism product portfolios with local characteristics. Studies have shown that intelligent recommendation systems based on tourist behavior data can effectively improve the market matching degree of product development and reduce trial-and-error costs.

In terms of operation and management, machine learning models based on historical data and real-time information enable dynamic pricing, intelligent scheduling and flexible dispatching, effectively lowering vacancy rates and operational costs.

From the perspective of industrial integration, AI platforms break down data barriers between agriculture, cultural and creative industries, e-commerce, logistics and other sectors, forming a collaborative ecosystem of "agriculture, tourism, culture and commerce", which enhances the overall risk resistance capacity and sustainable development momentum of rural industries.

Research by the Development Research Center of the State Council further points out that by reshaping content production, scenario experience and operation management, AI technologies have injected new impetus into the high-quality integrated development of culture and tourism at the county level [1].

2.2 Service Empowerment: Precisely Matching Tourists'Needs and Optimizing All-for-One Tourism Experience

AI realizes the intelligent upgrading of the entire process of rural tourism services through perception, analysis and response mechanisms. In terms of demand identification, machine learning algorithms conduct multi-dimensional clustering and tagging of tourist behavior data to form refined tourist profiles, laying a foundation for personalized recommendations. Studies have shown that intelligent recommendation systems can significantly improve tourists' travel planning efficiency and satisfaction. In terms of interactive services, the deployment of AI customer service robots, voice guide systems, AR real-scene navigation and other tools based on natural language processing covers the whole process of pre-travel consultation, in-travel guidance and post-travel feedback, providing particularly inclusive service experiences for elderly tourists and special groups. Practices in Anyang City show that the development of intelligent self-service scanning explanation services has effectively solved the shortage of tour guides in scenic spots during major holidays [2]. In terms of safety and emergency response, AI systems based on computer vision and multi-source data fusion enable real-time monitoring and automatic early warning of risks such as overcrowding, dangerous behaviors and extreme weather, greatly improving the safety guarantee level in the all-for-one tourism environment.

2.3 Cultural Empowerment: Vitalizing Local Cultural Resources and Consolidating the Foundation of Tourism Characteristics

AI provides a brand-new path for the protection, dissemination and re-creation of rural culture, effectively enhancing the cultural identity and core competitiveness of rural tourism destinations. In terms of cultural protection, AI-driven technologies such as image enhancement, 3D reconstruction, speech recognition and synthesis can systematically digitize and archive cultural carriers including traditional villages, ancient architecture, folk performances and dialect stories, realizing the permanent preservation and sustainable utilization of cultural resources. Research by Yan Kebing (2025) shows that generative AI has unique advantages in decoding cultural genes, capable of extracting core elements of local culture and carrying out creative transformation [3]. In terms of experience innovation, immersive projects combining AI and VR/AR technologies, such as virtual farming, intangible cultural heritage production and festival reconstruction, provide tourists with deeply participatory cultural experiences. More innovatively, AI systems can dynamically generate narrative paths based on tourists' real-time interactive behaviors, achieving personalized cultural experiences tailored to individual visitors. In terms of communication empowerment, AI-generated content (AIGC) technology assists in producing high-quality rural tourism promotional copy, short video scripts and multilingual tour guides, greatly improving the efficiency and coverage of cultural communication. Local practices also demonstrate that the attractiveness and influence of rural tourism have been significantly enhanced with the communication advantages of new media platforms.

3 Practical Dilemmas of High-quality Development of Rural Tourism Empowered by AI

Although the potential and value of AI in empowering rural tourism have been widely recognized, multiple dilemmas still exist in practice. These dilemmas can be analyzed from three dimensions:technical foundation, resource conditions and human capital.

3.1 Weak Digital Infrastructure, Superficial Application and Inadequate Adaptability of AI Technologies

Digital infrastructure is the material prerequisite for the application of AI. However, there is still a significant gap in digital infrastructure between rural and urban areas in China. Research by Niu Jiaru and Tao Shibo (2025) points out that county-level regions generally face problems such as incomplete network coverage, insufficient computing power and lack of sensing equipment, which are difficult to support the large-scale deployment of AI applications. Even in areas with basic conditions, the application of AI mostly remains superficial. A study by Deng Chufeng (2025) finds that AI applications in many rural tourism destinations are still limited to conventional functions such as online booking and intelligent recommendation, lacking technical solutions deeply adapted to rural-specific scenarios including agricultural production, folk activities and ecological protection [4]. In addition, the "cost trap" caused by rapid technological iteration is prominent — small and medium-sized operators can hardly afford frequent system upgrades, resulting in a dilemma of "falling behind without technology and bearing excessive costs with technology".

3.2 Lagging Resource Digitization and Low Level of Intelligent Integration of Culture and Tourism

High-quality cultural and tourism resources are the foundation for rural tourism development, yet the digitization level of resources directly affects the effectiveness of AI empowerment. At present, a large number of cultural and tourism resources in rural areas remain "dormant", lacking systematic digital collection, sorting and annotation. Yan Kebing (2025) notes that "gene decoding" of local culture is a prerequisite for the application of generative AI, but this work requires substantial preliminary investment and professional capabilities, which grassroots units often cannot accomplish independently. Even after digitization, the intelligent level of cultural and tourism integration remains low. Many smart tourism projects suffer from "technology silos"—data cannot be shared among different systems, weakening the overall empowerment effect of AI. Data barriers between departments and enterprises are particularly prominent, restricting resource integration and coordinated operation across the whole region.

3.3 Large Shortage of Professional Talents and Insufficient Endogenous Impetus for Rural Digitalization

Talents are the key to technological application. However, rural areas generally face a structural dilemma of "difficulty in attracting, retaining and cultivating talents". Niu Jiaru and Tao Shibo (2025) point out that there is a severe shortage of interdisciplinary talents at the county level who master both AI technology and cultural tourism operation, which has become the most critical bottleneck restricting AI empowerment of rural tourism. A survey in Anyang City also confirms this judgment: "There are not many rural tourism operators who understand management and publicity, the service standards of practitioners are low, and the industry management level is inadequate". At a deeper level, the talent shortage leads to insufficient endogenous impetus for rural digitalization — technological applications mostly rely on external support, lacking localized technological iteration and sustainable operation capacity. Although Guilin City has cultivated a group of "new farmers" through government-university-enterprise cooperation, the total number and quality of talents still cannot meet the rapidly growing industrial demand [5]. Research by Sánchez-Sánchez et al. (2025) also reminds us that the impact of AI applications on employment structure is two-sided — it may replace low-skilled workers while creating new jobs, which places an urgent demand on the skill upgrading of rural labor forces [6].

4 Improvement Paths for High-quality Development of Rural Tourism Empowered by AI

In response to the above practical dilemmas, coordinated efforts should be made from three dimensions:technical foundation, resource conditions and human capital to build a systematic improvement path.

4.1 Consolidate Digital Infrastructure and Promote a Rural-Adapted Intelligent Application System

Digital infrastructure is the "hard support" for AI to empower rural tourism. On the one hand, investment should be increased in network coverage, computing facilities and sensing equipment in rural areas. Niu Jiaru and Tao Shibo (2025) suggest constructing a "cloud-edge-device" collaborative computing infrastructure, that is, deploying core computing resources on the cloud, setting up data processing nodes at the edge layer, and installing lightweight intelligent devices at the terminal, forming a hierarchical and collaborative technical architecture. This architecture not only meets the computing demands of AI applications, but also reduces dependence on network transmission and improves system stability and response speed. On the other hand, it is necessary to promote lightweight, offline and localized adaptation of technologies. Differences in network conditions, power supply and maintenance capacity between rural and urban areas make general technical solutions hardly applicable directly. Therefore, intelligent applications suitable for rural scenarios featuring "low cost, easy deployment and maintenance-free" should be developed to lower technical thresholds and usage costs. Practices in Guilin City show that technology promotion strategies driven by actual application scenarios and problem-solving are more effective.

4.2 Advance Resource Digitization and Develop Differentiated Smart Cultural and Tourism Formats

Digitization of cultural and tourism resources is the "soft foundation" for AI empowerment. Firstly, a digital standard system for rural cultural and tourism resources should be established, specifying collection norms, data formats and metadata standards, laying a foundation for subsequent data aggregation and intelligent analysis. Yan Kebing (2025) points out that cultural gene decoding is a key link in resource digitization, requiring in-depth exploration of the internal logic and spiritual core of local culture to avoid superficial digitization that "only captures forms but not spirits". Secondly, data barriers should be broken to build a cultural and tourism data sharing platform. Through establishing a data hub and benefit-sharing mechanism, data interoperability and collaborative application among governments, enterprises and communities should be promoted. Thirdly, differentiated smart cultural and tourism formats should be developed based on local resource endowments. Blind imitation and homogeneous competition should be avoided, and each rural area should find its unique positioning with distinctive

advantages. The idea proposed by Maoming City to build an "AI + Cultural and Tourism Integration Innovation Pilot Zone around Haoxin Lake" is worth learning from—relying on local cultural IP with the highest recognition to concentrate resources on creating demonstration projects [7].

4.3 Improve Talent Introduction and Cultivation Mechanisms and Build a Rural Digital Cultural and Tourism Talent Team

Talents are the "primary resource" for AI to empower rural tourism. In terms of talent introduction, policy incentives should be adopted to attract young talents to return home for entrepreneurship. The "AI + Cultural Tourism Youth Entrepreneurship Competition & Incubation Program" proposed by Maoming City is an effective model, which lowers the threshold and risks of youth rural entrepreneurship through a package of measures including competition selection, financial support, venue provision and tutor guidance. In terms of talent training, a government-university-enterprise collaborative education mechanism should be constructed. The practice of Guilin City in promoting cooperation between local universities and AI enterprises to offer "AI + Cultural Tourism" micro-majors or practical workshops is worth popularizing. Anyang City has incorporated the "Application of AI in the Cultural Tourism Industry" into the regular training program for practitioners, focusing on improving the digital literacy of existing talents. In terms of talent utilization, a flexible talent employment mechanism should be established. External intellectual resources can be attracted to serve rural areas through science and technology commissioners, expert grassroots services and flexible talent introduction. Meanwhile, attention should be paid to cultivating a localized "new farmer" team, forming a sustainable talent development mechanism combining external support and internal cultivation.

5 Conclusion

The empowerment of AI for high-quality development of rural tourism is not only an inevitable trend driven by technology, but also an important path to achieve the strategic goals of rural revitalization. Through a systematic review of research progress at home and abroad, this paper reveals the triple mechanisms of industry, service and culture through which AI empowers rural tourism, analyzes the three major dilemmas of weak digital foundation, lagging resource digitization and talent shortage, and proposes improvement paths in consolidating infrastructure, activating resources and introducing and cultivating talents.

From the perspective of research prospects, continuous in-depth exploration is needed in the following aspects:firstly, to strengthen empirical research on AI empowerment of rural tourism, especially comparative analysis of differentiated effects in different regions and types of rural areas;secondly, to pay attention to the negative effects and ethical issues of AI applications and construct a responsible technology governance framework; thirdly, to explore community-participatory development models to ensure that the achievements of technological empowerment benefit local residents;fourthly, to promote interdisciplinary integrated research and boost collaborative innovation among technical science, management science and social sciences. Only in this way can AI truly become a "smart engine" driving the high-quality development of rural tourism and inject sustained impetus into the comprehensive revitalization of rural areas.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Biographies

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人工智能賦能鄉村旅遊高質量發展的機理、困境與提升路徑

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摘要：在數字鄉村建設與文旅深度融合的時代背景下，人工智能技術正成為推動鄉村旅遊轉型升級、實現高質量發展的核心驅動力。相較於傳統鄉村旅遊粗放式發展模式，人工智能能夠通過數據賦能、場景賦能與治理賦能，有效重構鄉村旅遊業態體系、優化遊客服務體驗、提升行業治理效能、激活鄉土文化價值，為鄉村旅遊提質增效提供全新發展動能。當前，我國人工智能賦能鄉村旅遊發展仍處於初級階段，存在數字基建薄弱、技術應用淺表化、文旅資源數字化程度不足、複合型人才短缺等現實困境，制約了智能技術與鄉村旅遊的深度融合。基於此，文章從產業、服務、治理三個維度系統闡釋人工智能賦能鄉村旅遊高質量發展的內在機理，剖析現實發展堵點與難點，並從技術適配、資源盤活、人才培育三個方面提出優化提升路徑，以期推動鄉村旅遊實現數字化、智能化、特色化高質量發展，助力鄉村全面振興。

關鍵詞：人工智能；鄉村旅遊；高質量發展；數字賦能；鄉村振興

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