Journal of Computer Science and Artificial Intelligence
ISSN: 3078-8242 (Print), ISSN: 3078-2309 (Online) | Vol. 7, No. 3, 2026

Research on the Mechanism of Artificial Intelligence in Tourism Management

Guoquan Zhao

Tianjin Qingqi Computer Technology Service Center, Tianjin 30190, China

Abstract: With the rapid development of information technology, the application of artificial intelligence in various industries is becoming increasingly extensive, and the tourism industry is also facing the opportunities and challenges of digital transformation. Against this background, this study aims to deeply analyze the mechanism of the role of artificial intelligence in tourism management. Through methods such as literature research, case analysis and empirical research, a systematic study is carried out on the application of artificial intelligence in various links such as tourism resource planning, tourist service, marketing management and security assurance. The research finds that artificial intelligence has significantly improved the efficiency of tourism management and the tourist experience through mechanisms such as technology empowerment, data-driven and collaborative optimization. However, in the process of its application, it also faces problems such as data privacy and security, technology cost and accessibility, and shortage of talents. This study provides a theoretical basis and practical guidance for the rational use of artificial intelligence technology in the tourism industry and promoting innovative development, and is of great significance for promoting the intelligent transformation of the tourism industry.

Keywords: Artificial Intelligence, Tourism Management, Action Mechanism, Big Data, Algorithm Model.

1. Introduction

In recent years, the rapid development of artificial intelligence technology has led to its wide application in various industries, demonstrating a significant enabling effect. As an important branch of information technology, AI is profoundly transforming the operation models and service forms of traditional industries through technologies such as machine learning, deep learning, natural language processing, and big data analysis [1]. Tourism, as an industry highly dependent on information technology and user experience, has also been deeply influenced by the development of artificial intelligence technology. With the acceleration of globalization and the continuous improvement of people's living standards, tourism has become an indispensable part of people's lives. Changes in the tourism consumption market not only reflect the development trends of the social economy but also pose higher requirements for the innovation of the tourism industry [5]. Against this backdrop, researching how artificial intelligence can be applied to all aspects of tourism management is not only an active response to technological innovation but also an inevitable choice for promoting the high-quality development of the tourism industry.

This research aims to reveal the mechanism of artificial intelligence in various aspects of tourism management, providing theoretical support and practical guidance for the innovative development of the tourism industry. Specifically, the study will start from multiple dimensions such as tourism resource planning, tourist services, marketing management, and safety guarantees, to analyze how artificial intelligence technology, through methods such as technological empowerment, data-driven approach, and collaborative optimization, enhances the efficiency and quality of tourism management [7]. From a theoretical perspective, this research helps to enrich the relevant theoretical system of artificial intelligence application in the tourism field, laying a foundation for subsequent research; from a practical perspective, the research results can provide scientific management decision-making basis for tourism enterprises, helping them better respond to market changes, optimize tourist experience, and achieve sustainable development. This research not only meets the urgent demand of the current tourism industry for technological innovation, but also provides new ideas and directions for the development of future smart tourism.

2. Literature Review

2.1. Theoretical Foundations of the Application of Artificial Intelligence in the Tourism Sector

Artificial intelligence, as a comprehensive discipline, encompasses core technologies such as machine learning, deep learning, natural language processing, and big data analysis. Machine learning uses algorithmic models to train and predict data, enabling the extraction of patterns from vast amounts of information and optimizing decision-making processes; deep learning, with its multi-layer neural network structure, demonstrates outstanding performance in areas such as image recognition and speech processing [4]. In the field of tourism management, these technologies are widely applied in resource planning, service optimization, and marketing decision-making. The theories related to tourism management emphasize the core of visitor experience, focusing on resource allocation efficiency and service quality improvement, which aligns perfectly with the technical characteristics of artificial intelligence. For instance, the supply-demand matching theory in tourism systems can be achieved through machine learning algorithms for dynamic optimization, while the study of tourist behavior can utilize natural language processing technology to conduct sentiment analysis on online reviews, thereby providing scientific basis for management decisions [6]. The theoretical foundation of the combination of the two lies in that artificial intelligence can use technological means to overcome the limitations of traditional management methods, while tourism management

theories provide clear directions and scenario support for the application of artificial intelligence.

2.2. Deficiencies in Existing Research and the Focus of This Study

Although the application research of artificial intelligence in tourism management has made certain progress, there are still many shortcomings. Firstly, most existing studies focus on the analysis of the application effects of specific technologies, lacking in-depth exploration of the mechanism of action, especially the internal logic of how technology can be deeply integrated with management processes has not been fully revealed [7]. Secondly, most studies are limited to a single link or a specific scenario, failing to construct a multi-dimensional mechanism model of the role of artificial intelligence in tourism management from an overall perspective, resulting in limited universality and guidance of the research results [8]. Moreover, discussions on the ethical issues and sustainability impacts of artificial intelligence in tourism management are relatively scarce, making it difficult to comprehensively evaluate its long-term value. This study aims to address these deficiencies by integrating three mechanisms: technology empowerment, data-driven approach, and collaborative optimization, to construct a multi-level and systematic mechanism model of the role of artificial intelligence in tourism management, providing a new perspective for theoretical research and practical innovation in tourism management [6].

3. Specific Application Aspects of Artificial Intelligence in Tourism Management

Artificial intelligence technology, by integrating Geographic Information System (GIS), Global Positioning System (GPS), and big data analysis, provides strong support for the scientific location selection and reasonable layout of tourist attractions. During the location selection process, artificial intelligence algorithms can comprehensively consider multiple factors such as geographical environment, population distribution, and transportation convenience, thereby generating the optimal location plan. For example, a machine learning-based regression analysis model can predict the tourist flow and potential consumption demands in a specific area, thereby providing data-driven decision-making basis for the location selection of tourism facilities [1]. Moreover, artificial intelligence can simulate the effects of different layout schemes and evaluate their impact on tourist experience and resource utilization efficiency, thereby achieving the optimization of tourism resources allocation. This intelligent location selection and layout method not only improves the spatial utilization rate of tourism resources but also significantly reduces development costs and risks [5].

Artificial intelligence technology also plays a significant role in the assessment of tourism resources' value and the analysis of their development potential. Through the comprehensive analysis of historical data, market trends, and tourist feedback using deep learning algorithms, artificial intelligence can accurately assess the unique value of tourism resources and their development potential. For instance, image recognition technology based on convolutional neural networks (CNN) can be used to analyze the aesthetic value of scenic natural landscapes, while natural language processing (NLP) technology can extract subjective evaluations of the quality of scenic area services from tourist comments [2]. The application of these technologies makes resource assessment more comprehensive and objective. At the same time, artificial intelligence can provide real-time suggestions for optimizing resource allocation through dynamic monitoring of resource usage. For example, through an intelligent scheduling system, service resources within the scenic area can be reasonably allocated during peak periods to improve overall operational efficiency [3]. This resource assessment and optimization method based on artificial intelligence lays a solid foundation for the sustainable development of the tourism industry.

The artificial intelligence algorithms provide technical support for personalized tourism service recommendations by analyzing tourists' behavioral data. Specifically, the recommendation system based on collaborative filtering and deep learning can generate customized travel routes, dining and accommodation recommendations, etc., according to tourists' interest preferences, historical behaviors, and real-time needs. For example, by using sequence pattern mining algorithms, the system can identify tourists' behavior patterns and recommend attractions or activities that match their preferences [1]. Moreover, artificial intelligence can further optimize the recommendation results by combining external environmental factors (such as weather and traffic conditions), thereby enhancing tourists' satisfaction and experience. This personalized service recommendation not only meets the modern tourists' demand for diverse and customized services, but also creates more value opportunities for tourism enterprises [6].

Intelligent customer service robots and intelligent guided tour systems are significant applications of artificial intelligence in the field of tourist services. They significantly enhance service efficiency and quality through technologies such as natural language processing (NLP) and speech recognition. Intelligent customer service robots can respond to tourists' consultation needs in real time, answer common questions, and provide immediate solutions. For instance, an NLP model based on the Transformer architecture can understand complex semantic information and generate natural and fluent response content, thereby enhancing the interaction experience [4]. Meanwhile, the intelligent guided tour system provides immersive guided tour services to tourists through augmented reality (AR) and virtual reality (VR) technologies. For example, tourists can obtain detailed information about attractions and navigation guidance through mobile applications, and even experience virtual recreations of historical scenes. The application of these technologies not only improves the tourist's service experience but also reduces the workload of human customer service, achieving efficient utilization of resources [7].

In emergency situations, artificial intelligence technology assists in formulating emergency plans and allocating resources, significantly enhancing the efficiency and accuracy of emergency responses. For instance, decision support systems based on reinforcement learning can quickly generate the optimal emergency plans based on real-time data, including evacuation route planning and rescue resource allocation [1]. Moreover, artificial intelligence can also execute dangerous tasks through intelligent devices such as drones and robots, thereby reducing the risk of casualties. For example, when a landslide occurs in a mountainous scenic area, drones can quickly survey the affected area and transmit real-time images to the command center, providing crucial

information for rescue operations [3]. This intelligent emergency response mechanism provides strong technical support for the tourism industry to deal with emergencies, and also lays the foundation for improving the overall safety management level.

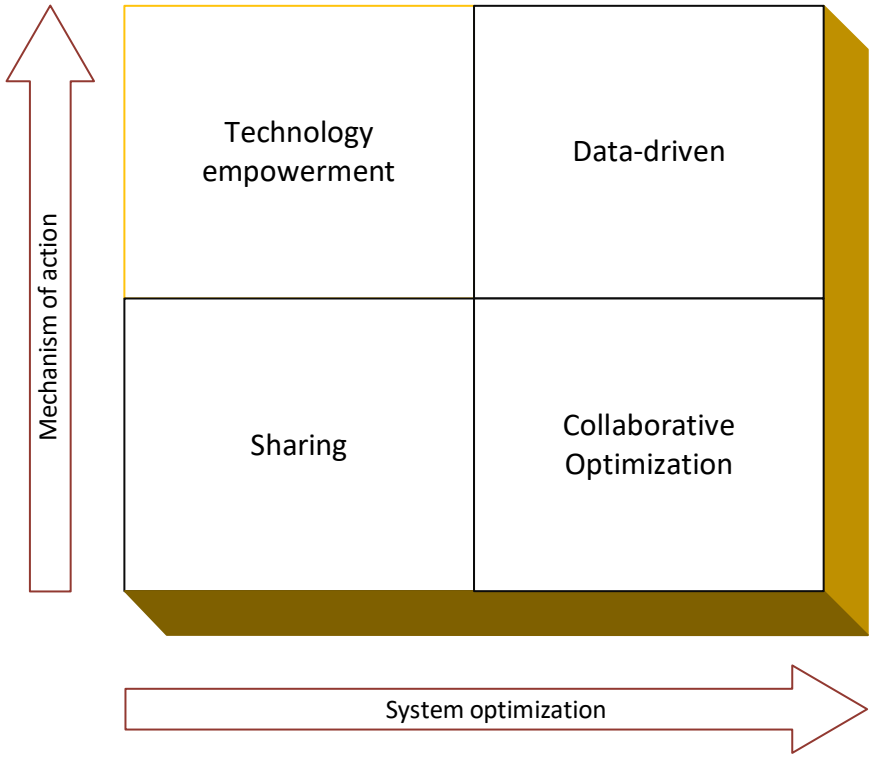

Figure 1. The mechanism model of the role of artificial intelligence in tourism management

References are cited in the text just by square brackets [1]. (If square brackets are not available, slashes may be used instead, e.g. /2/.) Two or more references at a time may be put in one set of brackets [3, 4]. The references are to be numbered in the order in which they are cited in the text and are to be listed at the end of the contribution under a heading References, see Table 1.

Table 1. Impact of Artificial Intelligence on Tourism Table

Numble	Tourism resource planning	Tourist Services	Tourism Safety
1	Intelligent Site Selection and Layout	Personalized service	Risk Warning
2	Resource assessment	Intelligent Customer Service	Emergency response
3	Resource optimization	Tour Guide	Effect evaluation

4. Construction of the Mechanism Model of Artificial Intelligence in Tourism Management

Artificial intelligence technology, through its powerful computing capabilities and intelligent algorithms, provides unprecedented technical support for all aspects of tourism management, thereby profoundly changing the traditional management methods. Big data analysis technology can integrate data sets from multiple heterogeneous sources, such as tourist behavior data, geographical environment data, and socio-economic data, and extract valuable information through data mining and pattern recognition technologies, providing scientific basis for tourism resource planning, service optimization, and marketing decisions [4]. In addition, machine learning technology achieves prediction and optimization of complex problems by training models, such as using supervised learning algorithms to predict changes in tourist flow trends, or using unsupervised learning algorithms to cluster analyze tourist preferences, thereby improving management efficiency and accuracy [6]. Deep learning technology further expands the application boundaries of artificial intelligence in tourism management, especially in the fields of image recognition and natural language processing. For example, image recognition technology can be used in intelligent monitoring systems to monitor the safety status of scenic spots in real time, while natural language processing technology is widely applied in intelligent customer service and tourist opinion analysis, significantly improving service response speed and quality [4]. The comprehensive application of these technologies not only enhances the intelligence level of tourism management but also promotes the automation and refinement of management processes, laying a solid foundation for the high-quality development of the tourism industry. The application of artificial intelligence technology effectively promotes the coordinated operation of all aspects of tourism management, breaks down information barriers, and enhances the overall management efficiency and effectiveness. In the traditional tourism management model, due to the existence of information islands, there is often a lack of effective communication and collaboration between different management links, resulting in resource waste and inefficient management. However, artificial intelligence technology, by building a unified data platform and intelligent management system, realizes real-time sharing and efficient circulation of information, thereby creating conditions for the collaborative work of all links [1]. For example, in the planning and marketing management of tourism resources, artificial intelligence technology can achieve supply-demand matching through data analysis, ensuring that the development of

tourism products is in line with market demand; in the relationship between tourist services and safety guarantee, the collaborative operation of intelligent monitoring systems and emergency response systems can promptly detect and handle potential risks, thereby ensuring the safety and quality of tourists' experience [7]. In addition, artificial intelligence technology also further improves the overall management efficiency by optimizing resource allocation and process design. For instance, the resource scheduling system based on intelligent algorithms can dynamically adjust the distribution of tourists and the use of facilities in scenic areas according to real-time data, thereby maximizing the utilization rate of resources [1]. This collaborative optimization mechanism not only enhances the overall efficiency of tourism management but also provides important support for the sustainable development of the tourism industry, fully demonstrating the significant role of artificial intelligence technology in promoting the modernization process of tourism management.

The application of artificial intelligence in tourism management relies on the collection, storage, and analysis of massive amounts of data. However, this process also comes with significant data privacy and security risks. Firstly, in the data collection stage, tourism enterprises obtain sensitive information such as tourists' behavior data, preference information, and geographical locations through intelligent devices, mobile applications, and social media channels. The extensive collection of such data may cause tourists to worry about the leakage of their personal privacy [6]. Secondly, in the data storage stage, as artificial intelligence systems need to process large amounts of unstructured data, traditional security protection measures may be unable to cope with complex network attacks, thereby increasing the risk of data leakage [8]. Moreover, during the data usage process, some enterprises may have behaviors of data abuse, such as using user data for unauthorized third-party marketing activities, which further exacerbates the trust crisis of tourists regarding data security. Therefore, how to maximize the value of data while ensuring data privacy becomes one of the key issues that need to be urgently addressed in the application of artificial intelligence in tourism management.

The application of artificial intelligence technology has significantly enhanced the efficiency of tourism management, but its high technical costs and complex implementation processes have also brought huge economic pressure to tourism enterprises. On one hand, the research and maintenance of artificial intelligence technology require substantial capital investment, including the purchase of hardware equipment, the development of software systems, and the optimization of algorithm models, which undoubtedly poses a heavy burden for small and medium-sized tourism enterprises [5]. On the other hand, the acquisition and application of artificial intelligence technology are relatively difficult, especially in regions with relatively weak technical infrastructure. Enterprises may face the problem of insufficient technical compatibility. Moreover, the rapid iteration of artificial intelligence technology requires enterprises to continuously invest resources for updates and upgrades, which further increases their operational costs [7]. Although some large enterprises can reduce technical costs through scale effects, for the vast majority of small and medium-sized tourism enterprises, the issue of technology accessibility still restricts the popularization and deepening of artificial intelligence in tourism management.

As artificial intelligence technology is widely applied in tourism management, the issues of data privacy and security have become an urgent and important topic to be addressed. The collection, storage, and use of tourism data involve a large amount of sensitive information of users. In case of data leakage or abuse, it will cause serious damage to tourists' rights and the industry's reputation [6]. Therefore, establishing a sound data security management system is the top priority. By formulating strict data access permission management mechanisms and clearly defining the rights and responsibilities of different entities in data usage, the risk of data leakage can be effectively reduced. Moreover, adopting advanced encryption technology to protect tourism data and ensuring its security during transmission and storage is another key measure [8]. For example, homomorphic encryption technology can perform calculations without decrypting the data, thereby providing tourism enterprises with more efficient data processing solutions while safeguarding data privacy. At the same time, strengthening the construction of laws and regulations is also an indispensable part. The government should introduce specific regulations related to tourism data security, clearly define the boundaries of data collection and usage, and increase the punishment for violations to form an effective deterrent effect.

The application of artificial intelligence technology in the tourism industry has a promising future, but its high technical costs have become one of the important factors restricting its widespread adoption. When introducing artificial intelligence technology, tourism enterprises, especially small and medium-sized ones, often face multiple economic pressures such as research and development costs, equipment investment, and subsequent maintenance expenses [5]. To address this challenge, the government, enterprises, and research institutions need to strengthen cooperation to jointly promote the optimization and popularization of technology costs. On one hand, the government can establish special funds or provide tax incentives to support tourism enterprises in conducting research and application of artificial intelligence technology; on the other hand, research institutions should focus on developing low-cost and high-efficiency technical solutions to meet the actual needs of small and medium-sized enterprises [7]. Moreover, enhancing technology promotion and training is also a key to improving the accessibility of artificial intelligence technology. For example, by holding technical training courses, industry seminars, etc., to popularize basic knowledge and application skills of artificial intelligence to tourism practitioners, it helps them better adapt to technological changes. At the same time, establishing open technology platforms to promote technology resource sharing can also help lower the threshold for enterprises to obtain technology, and promote the widespread application of artificial intelligence technology in the tourism industry.

If you follow the “checklist” your paper will conform to the requirements of the publisher and facilitate a problem-free publication process.

5. Conclusion

This study systematically explored the application methods, mechanism of action, and profound impact of artificial intelligence in tourism management. The research found that artificial intelligence technology has achieved innovative applications in various aspects such as tourism resource planning, visitor services, marketing management, and security through means such as big data analysis, machine

learning, and deep learning [1]. For instance, intelligent site selection and layout optimization have improved the efficiency of scenic area development, personalized service recommendations have significantly enhanced the visitor experience, and precise marketing strategies and real-time risk warnings have provided strong support for the decision-making and safety management of tourism enterprises [2, 3]. Additionally, this study proposed three mechanism models of technology empowerment, data-driven, and collaborative optimization, revealing how artificial intelligence can achieve changes and upgrades in tourism management models through technical support, data mining, and resource integration. Regarding the issues faced during the application of artificial intelligence, such as data privacy and security, technical costs and accessibility, as well as the shortage of professional talents, this study also proposed corresponding solutions, including establishing sound data security management systems, strengthening cooperation among government, academia, industry, and research to reduce technical costs, and addressing the talent shortage problem through education adjustment and policy guidance, providing theoretical basis and practical guidance for the sustainable development of artificial intelligence in tourism management [1].

Although this study has achieved certain results in the mechanism of the role of artificial intelligence in tourism management, there are still some shortcomings that need to be improved urgently. Firstly, the current mechanism models constructed mainly rely on existing literature and typical cases, and their universality has not been verified through large-scale empirical validation. Future research needs to further expand the sample range and enhance the explanatory power and applicability of the models [7]. Secondly, this study mainly focuses on the scenario where artificial intelligence is independently applied in tourism management, and the potential value of its integration with other emerging technologies (such as blockchain, Internet of Things, etc.) is explored relatively limitedly. For example, blockchain technology can provide higher transparency and security in tourism data sharing and transactions, while the Internet of Things can further optimize tourism resource allocation and service processes through real-time monitoring and intelligent control [8]. Therefore, future research should focus on the collaborative application of artificial intelligence with other technologies and explore more diversified technological integration paths. Moreover, with the rapid development of artificial intelligence technology, its ethical issues and long-term social impacts in tourism management also require more attention. For instance, algorithm bias may lead to unfairness in tourism services, and excessive reliance on data may weaken the subjective initiative of human decision-making. These problems not only require in-depth discussions by the academic community but also the joint efforts of industry and policy makers to ensure the healthy development of artificial intelligence technology in tourism management and inject new impetus into the sustainable growth of the global tourism industry [8].

Acknowledgements

Natural Science Foundation.

References

[1] Li, M. H., Liu, J., & He, X. L. (2024). Research on utilizing artificial intelligence technology to enhance the customized tourism service experience. Shenyang Culture and Tourism, (7), 53–55.

[2] Wang, R. T., Song, R., & Zhou, G. M. (2023). Review and prospect of domestic and international tourism demand research since the 21st century. Social Scientist, (3), 36–43.

[3] Sun, Q., Jiang, J. J., Li, X. Y., & Tang, S. Q. (2022). Research on tourism demand forecasting in the post-pandemic era. China Soft Science, (S01), 217–226.

[4] Xie, Q. X., Su, H. W., Tan, R. H., Lin, X. M., & Wang, S. Y. (2021). A review of research on intangible cultural heritage tourism based on artificial intelligence. Science and Innovation, (5), 108–109.

[5] Wei, M. Y. (2024). Research on changes in tourism consumption market and new tourism industry development strategies. National Circulation Economy, (10), 116–119.

[6] Li, Y. T. (2024). Problems and governance countermeasures of artificial intelligence in cultural tourism applications. Humanities Today, (3), 8–13.

[7] Yang, Y., Lin, M. S., Wang, J. W., Wen, T., Yang, X. Z., & Liu, J. (2023). Forms of practice, mechanism paths and possible research breakthroughs — Dialogue record of scholars on the topic of "Technological innovation and high-quality development of tourism". Tourism Forum, 16(4), 1–18.

[8] Gretzel, U. (2020). Discussions on China's tourism development — Research frontiers in tourism information technology (Z. Xiang & Y. Ding, Trans.). Tourism Tribune, 35(1), 1–3.