

Article

Revolutionizing the personalized tourism experience: The role of ChatGPT technology in enhancing destination image and tourist interactions

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Abstract: This study examines the application and impact of ChatGPT in the tourism industry. It provides an overview of ChatGPT's development history, characteristics, and contributions to tourism, including its collaborative use with other technologies. The study applies experience economy theory and destination image theory to analyze the relationship between ChatGPT and tourism. It explores various application scenarios, such as personalized tourism, real-time consulting, intelligent tour guides, and language translation for cultural experiences. The implementation system of ChatGPT in the tourism industry is discussed, covering aspects like data collection, user interface design, deployment of user feedback mechanisms, and prompt strategies. Challenges related to data accuracy, knowledge updating, and ethical considerations are addressed. The study investigates the impact of ChatGPT on tourists' behaviors, including their experiences, purchasing decisions, competitive advantage, and preferences for self-service. It concludes by suggesting future research directions.

Keywords: ChatGPT; personalized tourism experience; enhancing destination image; tourist interactions

1. Introduction

In the era of the digital economy, technology impacts various aspects of our lives [1]. The tourism industry, however, has faced unique challenges, especially in the wake of the COVID-19 pandemic [2], which imposed travel restrictions worldwide, resulting in drastic declines in tourism numbers, the closure of popular destinations, and substantial economic losses for the sector [3]. This situation has compelled tourism operators to adopt innovative digital technologies, including artificial intelligence, to support contactless and remote services, aiming to meet evolving traveler demands [4,5].

Within this context, ChatGPT technology has emerged as a promising tool that can transform the tourism industry. ChatGPT, a language model developed by OpenAI, uses natural language processing (NLP) to simulate human conversation, making it possible to provide accurate, personalized, and real-time travel assistance [6,7]. This technology can be integrated across multiple functions, from itinerary planning and language translation to real-time consultations and cultural guidance, catering to both tourists and tourism organizations [8]. However, despite its rapid adoption, research on ChatGPT's specific applications, limitations, and theoretical foundations in tourism remains limited.

While previous studies have explored the benefits of digital technologies in tourism, particularly during the pandemic, few have examined the unique impacts of language models like ChatGPT on the personalized tourism experience. Existing

research primarily addresses broader AI applications in tourism without focusing on the intricacies of ChatGPT's role in enhancing destination image, facilitating real-time interactions, and providing adaptive, context-specific recommendations [9]. This study seeks to fill this gap by systematically exploring ChatGPT's applications and implications within the tourism sector and analyzing its potential benefits and challenges through the lens of experience economy theory and destination image theory.

Therefore, this study aims to:

- (1) Identify and evaluate ChatGPT's contributions to personalized tourism, destination image enhancement, and real-time tourist interaction.
- (2) Analyze the implementation processes and systems of ChatGPT within the tourism industry, including data collection, interface design, user feedback, and prompt strategies.
- (3) Examine the ethical and operational challenges associated with ChatGPT applications in tourism, such as data privacy, algorithmic bias, and misinformation.
- (4) Provide recommendations for future research on integrating ChatGPT in tourism practices to create a competitive advantage.

By addressing these objectives, this study will contribute to an understanding of ChatGPT's transformative role in tourism, offering practical insights for industry stakeholders and adding depth to theoretical discussions on AI's impact on tourism.

The article will be divided into the following sections: the background section describes the principles of ChatGPT technology, its characteristics, and its integration with other technologies. Relevant theories related to the application of tourism technology are presented. The second, third, and fourth sections are discussed around Application-Implementation-Impact. The fifth section focuses on the ethical issues in the application of ChatGPT. Finally, it concludes with suggestions for future research directions.

2. Background

2.1. ChatGPT: Overview

2.1.1. Origin and development

ChatGPT technology is a chat-based artificial intelligence technology developed based on the GPT model from OpenAI [10]. The GPT model, as a deep learning-based natural language processing model, is trained on large-scale textual data to achieve human language understanding and generation. GPT has evolved through several versions of refinement, initially GPT-1, which utilizes the encoder-decoder model in the transformer architecture and is fine-tuned by pre-training on massive unlabeled textual data. Then GPT-2 improves GPT-1 with richer parameters to enhance the quality of generated text [11].

ChatGPT is based on GPT-2 as the core, with specific fine-tuning and application extensions to meet the requirements of chatty dialogue scenarios [12]. Pre-training on an extensive range of conversational data enables ChatGPT to mimic human conversation to understand meaning, logic, and context in natural language and

produce consistent and reasonable responses. When training ChatGPT, large amounts of conversational data, such as chat transcripts, are generally used to ensure the model's adaptability to multiple language styles and topics [13]. To enable the model to capture nuanced structures and patterns within conversations without extensive labeled data, a self-supervised learning approach is employed. This approach allows ChatGPT to learn conversational structure, topics, and expressions, improving its ability to generate coherent and contextually appropriate responses [14].

It should be noted that although ChatGPT generates conversations, it still faces challenges. For example, there may be incorrect answers or semantic ambiguities, and the ability to understand complex or specialized domain questions is limited. In addition, the model is affected by the training data with biases and errors [15].

2.1.2. Characteristics and contributions

The characteristics of ChatGPT applied to the tourism industry include instant interaction, personalized recommendation, and contextual adaptation [16,17]. It can achieve real-time dialogue with users and fast response to meet users' immediate needs; personalized travel recommendations through the analysis of massive dialogue data; specific comprehension and analysis of natural language; and give accurate answers according to the conversation context and users' needs.

The above characteristics of ChatGPT contribute to the travel industry as follows.

- (1) Improve user experience and satisfaction. ChatGPT provides travelers with quick answers to their questions and accurate travel information, which increases traveler satisfaction and improves their travel experience.
- (2) Expand and diversify services. ChatGPT provides a broader range of travel services to enrich travelers' choices according to their preferences and needs so that they can better customize and enjoy their trips.
- (3) Improve the efficiency of travel organizations. ChatGPT relieves the pressure on human customer service, speeds up the resolution of problems, reduces labor costs, and improves service efficiency by handling user inquiries.
- (4) Enhance the competitiveness of the industry. ChatGPT provides tourists with personalized, timely, and accurate services, creates a good brand image, improves competitiveness, and attracts more tourists to choose its services.

ChatGPT has essential applications in the tourism industry through the above characteristics and contributions and can benefit tourism organizations, platforms, and tourists.

2.2. Digital travel

2.2.1. Digital tourism

Digital tourism is the use of digital technology as a means to deliver tourism services and experiences through online platforms or apps [18,19]. The digital tourism boom has enabled users to access travel information by purchasing hotel and attraction tickets through their cell phones, tablets, or computers.

The ChatGPT tool enables people to take worthwhile virtual tours. It can be used as an intelligent dialogue system to provide users with instant interaction and personalized recommendations [20]. Users can obtain travel information and make suggestions by talking to ChatGPT. ChatGPT can improve the travel experience by

providing personalized travel recommendations and customized travel solutions based on users' preferences.

2.2.2. ChatGPT collaboration with other technologies

ChatGPT and other digital technologies collaborate to promote digital tourism. It can be used with speech recognition technology for voice dialogue interaction [21]. It allows users to interact with ChatGPT by voice to get their desired tourism information. Secondly, with image recognition technology, attractions and relics can be identified to provide relevant information [22,23]. This approach can recognize the attractions or relics in the pictures after the user uploads them through ChatGPT to provide relevant explanations and understand the historical background. Thirdly, geolocation technology can recommend nearby attractions and restaurants to the user. When the user is in a particular area, ChatGPT can recommend nearby tourism resources and services according to the user's location. With the cooperation of the above technologies, ChatGPT can provide diversified tourism services.

Furthermore, the tourism industry can integrate other emerging technology applications. Virtual and augmented reality technologies can give travelers an immersive experience and richer travel content [24,25]. Big Data and Artificial Intelligence help travel practitioners understand customer needs and provide personalized recommendations and services [13]. Touchless payment, self-service ticket collection, and intelligent access control increase the safety of tourism venues. These emerging technologies are designed to make tourism safer and more personalized and enhance tourism organizations' competitiveness.

2.3. Theoretical explanations

For the phenomenon of ChatGPT combined with tourism, although specific tourism theories may not yet directly explain this combination, the following theories may provide some possible explanations.

2.3.1. Experience economy theory

The Experience Economy Theory can be used to explain the connection between ChatGPT and the tourism industry and its impacts. According to this theory, the experience economy satisfies consumers' sensory needs by providing memorable experiences [26]. It emphasizes the psychological experience of consumers in the process of generating consumption behaviors. It believes consumers can change their consumption behaviors by generating exceptional sensory experiences and thinking identities to find a new existential value for their goods.

Regarding tourism, ChatGPT can bring tourists a more personalized and interactive experience [27]. ChatGPT is an intelligent assistant that can communicate with tourists and provide relevant information and opinions. It can provide diverse content for tourism through language generation and semantic understanding capabilities, such as destination profiles, travelogue recommendations, and local culture interpretations. The technology may customize travel itineraries, recommend attractions and activities, and provide real-time navigation based on tourists' preferences. This interactive and personalized experience facilitates enhanced interaction between tourists and destinations.

2.3.2. Destination image theory

Destination image is often regarded as a potential tourist’s evaluation of the destination, which integrates people’s ideas about the destination’s social, economic, and tourism development [28]. Its research mission includes exploring the core resources of the tourist destination, refining the image concepts that can comprehensively show the place’s natural characteristics and heritage, and highlighting its characteristics through particular product development. Destination images can be divided into three types: initial, induced, and comprehensive [29].

3. ChatGPT application scenarios

ChatGPT has a positive effect on the research of tourism destination image theory. This theory emphasizes the critical role of destination image in tourists’ behavior and choice process. ChatGPT can create a positive image of the destination (including initial, induced, and comprehensive images) to enhance tourists’ perception and impression of the destination through the following ways.

- (1) Detailed information. ChatGPT can give users a detailed introduction to destination attractions, local cultural characteristics, and historical sites. It will help travelers to have a preliminary understanding of the destination and create an initial image.
- (2) Suggestions. ChatGPT can recommend suitable destinations based on the user’s needs and preferences. It can help shape the induced image through personalized suggestions facilitated by destination advertising, promotions, and campaigns.
- (3) Interaction and Experience Sharing. ChatGPT interacts, answers queries, and assists travelers. In interacting with ChatGPT, travelers may gain more information about the destination. It may enrich their composite image of the destination, combining travel experiences with prior knowledge to form a comprehensive impression.

These tourism theories help people to understand the connection between ChatGPT and tourism and provide the foundation for decision-making by tourism practitioners when applying these theories. However, it should be noted that the theories only provide an explanatory framework, and success in practical application still needs to be adjusted according to the actual situation and market demand.

By textually interacting with chatbots for information and advice, users can access a global travel experience regardless of their location [17,30]. On the other hand, present tourism relies on local guides, brochures, and actual human and physical resources, resulting in travelers needing to visit the destination to experience it. **Table 1** lists their differences.

Table 1. Compare ChatGPT’s tourism with present tourism.

Differences	ChatGPT tourism	Present tourism
Information acquisition	Provision of travel information and advice through AI	Reliance on local guides, travel brochures, and hands-on experience
Field requirements	No need to physically arrive at the destination	Need to travel to the destination physically
Interaction mode	Textual interaction	Face-to-face communication, real-time interaction
Interaction objects	Chatbots, virtual assistants	Local people, tour guides, and other travelers

Table 1. (Continued).

Differences	ChatGPT tourism	Present tourism
Resource dependency	Dependent on virtual resources and information provided by the AI engine	Dependent on actual physical resources
Customizability	Tailoring the travel experience to the user's needs	Needs to be arranged based on existing resources and circumstances
Context-awareness	Based on extensive data and contextual information	Limited scene and environmental awareness
Characteristics	Virtual experience, gaining information and experience via chat	Field trips, in-person sightseeing, and experience
Real-time	Immediate access to information and answers	Need to wait for field experiences and information from locals
Geo-constrained	With no geographic constraints, people can tour the world	Constrained by physical destinations and travel distances

It is true that ChatGPT and other AI-related technologies are extensively utilized and have the power to change how people learn and ultimately grow. Fesenmaier and Wöber [1] have examined the use of such technologies and underlined their significance in some fields.

In travel scenarios, taking advantage of ChatGPT travel can provide travelers with a personalized and convenient travel experience, helping them plan their trips, explore unknown places, and have a more satisfying travel experience.

3.1. ChatGPT as a guide for tourists

3.1.1. Personalized travel

Every tourist has different travel preferences and wants personalized suggestions [31]. By interacting with ChatGPT, tourists can share their preferences, hobbies, and trip objectives, and ChatGPT can use this information to recommend suitable tourist attractions, thereby providing a more personalized travel experience [8]. For instance, a traveler may inquire about the following:

“Hello! I’m considering a vacation to destination Nanjing City, but I’d appreciate some customized travel advice. Can you assist me?”

The ChatGPT answer:

“Hello! I can assist you with customized travel advice for Nanjing. Here is some advice to help you make a decision:

Must-visit attractions: Explore historical landmarks like the Ming Xiaoling Mausoleum, Sun Yat-sen Mausoleum, and the Nanjing City Wall. Cultural sites: Visit the Nanjing Museum, Presidential Palace, and Confucius Temple for a deeper understanding of the city’s history and culture. Natural beauty: Take a stroll by Xuanwu Lake...”

Travelers may utilize ChatGPT to find local delicacies and restaurants depending on their taste preferences, dietary needs, and financial constraints. For tourists who enjoy eating out, ChatGPT can suggest reputable restaurants in the area that will meet their needs. ChatGPT may suggest acceptable eateries for tourists with special dietary requirements, such as vegetarian or low-calorie alternatives.

Additionally, ChatGPT may suggest expensive or lavish upmarket eating establishments that fit a traveler’s budget. Whether a traveler is looking for a luxury meal or a specialized snack, personalized recommendations from ChatGPT based on

individual requirements are available. For instance, a tourist may inquire about the following:

“I’m interested in gastronomy, particularly local delicacies in Nanjing.”

The ChatGPT answer:

“Certainly! Here are some simplified recommendations:

Salted Duck: A local specialty in Nanjing, you can find this dish at many local restaurants and food stalls.

Nanjing-style Dumplings: These dumplings are filled with minced meat and served with a flavorful sauce. Visit “Confucius Temple Qinhuai Renjia” near the Confucius Temple to try them...

Here are a few moderately priced excellent eateries:

Xiaolongkan Hot Pot: Known for its spicy hot pot, this restaurant provides a flavorful dining experience at reasonable prices...”

In response to the visitor’s demands, ChatGPT will recommend suitable eateries.

3.1.2. Real-time counseling

Travelers typically have a variety of demands and queries, and they hope to get support and answers quickly [32]. Travelers may rapidly find helpful information like the weather, suggested attractions, and transportation details in their destination by interacting with ChatGPT. They can also get specialized advice to make their trip more stable.

Travelers can inquire on ChatGPT about the weather in their destination before leaving. They may answer questions like,

“What is the weather like tomorrow?” and “Is it going to rain this weekend?”

ChatGPT will provide a precise weather forecast to inform visitors based on the information provided.

“The weather will be nice tomorrow, and your mood will surely be pleasant on the way to work. There will be light rain during the weekend, but you can stay at home and enjoy the view outside the window while watching TV.”

Visitors can use ChatGPT to inquire about transportation-related topics, including bus schedules, taxi services, or trains. For instance,

“I need directions to a neighboring museum.” Alternatively, “What are my options for getting from the airport to the city center?”

To assist guests in properly planning their trip, ChatGPT will offer precise transportation information, such as:

“You can take bus number 11, which is only two stops from the museum and takes about ten minutes.”

3.1.3. Intelligent guide

They may receive in-depth tours without needing a human guide by chatting with ChatGPT, which can deliver virtual tours [16]. When visitors are considering visiting a specific location, they communicate with ChatGPT to learn more about the location’s history, architectural features, and artifact interpretation.

Tourists may use ChatGPT to inquire about a building’s history by typing in the following:

“What is the history of building the Great Wall?” Or, “Can you describe the building’s architectural style?”

According to the question's content, the building's history, and other factors, ChatGPT will offer a thorough response.

"The Great Wall, known as in Chinese, is one of the most famous architectural marvels in China and a testament to ancient engineering. Its history dates back to the... The architectural style of the Great Wall varies due to its extensive span across different regions and its construction over various dynasties... Different sections of the Great Wall exhibit unique local characteristics..."

Visitors may discover more about the historical context and architectural style and how to appreciate paintings from ChatGPT. For instance, visitors may chat with ChatGPT while they are in the museum by asking:

"Can you tell me what the meaning of this painting is?" Alternatively, "What does this sculpture represent?"

ChatGPT will interpret it based on facts and give additional context on the creator and style to assist visitors in better understanding and appreciating the artwork.

Visitors may have a virtual tour without an in-person guide by interacting with ChatGPT. The inquiries can give them many facts about the location, enhancing their understanding and familiarity. It gives travelers additional enjoyable and educational options by enabling them to learn about the history, culture, and art of the gorgeous region without the assistance of a tour guide. Visitors will continue to get correct ChatGPT responses, offering them a positive guided tour experience.

3.1.4. Language translation

To assist users who have trouble communicating across languages, ChatGPT can also be used for language translation [33]. Tourists may have trouble communicating with natives because of language issues. To communicate and obtain information from locals, travelers can use ChatGPT's text-based interface to input the text that requires translation, and ChatGPT will swiftly translate it into the target language.

For instance, ChatGPT can be used to translate statements when they need to ask locals for directions, such as:

"May I ask how to walk to the nearby park?"

ChatGPT will immediately translate the phrase into the local tongue, allowing travelers to query locals and receive the necessary answers.

For reading textual material such as menus and local road signs, ChatGPT can be used as a language-translation tool. More opportunities for interaction between travelers will allow them to learn more about the local way of life, sample the cuisine, and enjoy their trip more.

3.1.5. Cultural experiences

Traveling must include cultural experiences besides eating [34]. ChatGPT can aid visitors in better understanding regional culture and traditions. It offers details on regional festivals and artistic events so visitors can learn more about the community and have a more memorable experience.

Visitors can inquire about regional traditional festivities while interacting with ChatGPT, such as:

"The Chinese New Year in China or the Festival of the Sacred Fire in Spain."

ChatGPT response:

ChatGPT's response: "Certainly! The Chinese New Year, also known as the Spring Festival, is celebrated with family gatherings, the cleaning of homes to welcome good fortune, and various decorations such as red lanterns and paper cuttings for prosperity. Another key tradition is giving red envelopes, called *hóngbāo* in Chinese, which are decorated red envelopes typically containing money. They are given during major celebrations such as Chinese New Year or weddings to symbolize good fortune, prosperity, and blessings for the recipient. In Spain, the Festival of the Sacred Fire, also known as *Las Fallas*, takes place in Valencia every March. This celebration is known for its elaborate papier-mâché monuments, or *fallas*, which are paraded through the city and later burned in large bonfires, accompanied by fireworks and street festivities."

They will learn crucial details about the date, place, and celebration traditions through ChatGPT. Tourists can see the events and their cultural significance firsthand by participating in local celebrations.

ChatGPT can also recommend cultural events. Visitors can get more information about the performances and buy tickets. Attending the local artists' performances allows attendees to benefit from the festival's cultural attractions.

For people interested in history, ChatGPT can suggest historical sites. Visitors will have a deeper grasp of the culture as the histories of these landmarks are exposed. They might then apply this information to their travels to learn more about the past and present of the locals.

3.2. ChatGPT's support for tourism practitioners

ChatGPT offers a range of applications that can support tourism practitioners in customer service, education, marketing, data analytics, and online assistance [16]. These functions enable practitioners to streamline operations, enhance customer engagement, and make data-driven decisions, thereby adding value across multiple aspects of tourism.

Handling Travel Complaints. While traveling, tourists may experience dissatisfaction with the services received. ChatGPT, as a neutral mediator, assists travelers by providing information on complaint processes and directing them to appropriate channels, which facilitates a timely resolution [35].

Tourism Data Analysis. ChatGPT supports tourism practitioners in analyzing essential data by processing requests related to sales figures, market trends, and consumer behavior. This real-time analysis aids decision-making and enables practitioners to respond effectively to market changes.

Tourism Promotion and Marketing. ChatGPT is also valuable in promoting tourism products and services. It can deliver tailored information on destinations, events, and discounts based on user needs and preferences, helping to increase engagement, sales, and brand exposure.

Tourism education and training. Practitioners can talk to ChatGPT, ask questions, and get real-time feedback and guidance. It helps understand destination knowledge, customer service skills, and travel management and improves professionalism.

3.3. ChatGPT application in the three stages of travel

Figure 1 presents the ChatGPT application in the three stages of travel. The following strategies may enhance tourist decision-making and the experience when the three travel phases (pre-trip, trip, and post-trip) are combined with ChatGPT application scenarios [16].

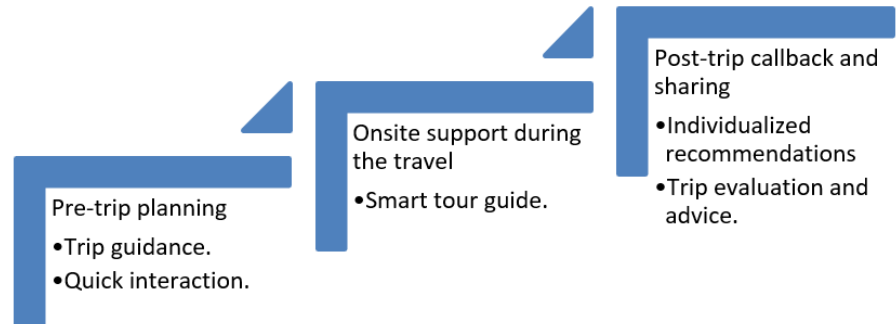


Figure 1. ChatGPT application in the three stages of travel.

3.3.1. Pre-trip itinerary planning

Trip guidance. ChatGPT may suggest customized itineraries based on guests' preferences, spending capacity, and time constraints. Travelers may have customized vacation plans, ideas for locations to go, and transportation plans through ChatGPT conversations, all of which help them make decisions.

Quick interaction. When planning a trip, travelers may encounter issues, including the best time of year to visit, visa restrictions, and travel insurance. ChatGPT may provide real-time advice and Q&A services to aid travelers with problems and guide them in making informed decisions.

3.3.2. Onsite support during the travel

Smart tour guide. ChatGPT can act as a virtual tour guide for travelers by providing in-depth information on the destination, the historical and cultural context, and the regional customs and traditions. Such a tour guide tool might enhance travel plans, provide accurate instructions, and help passengers comprehend their surroundings.

3.3.3. Post-trip callback and sharing

Individualized recommendations. Based on user comments and past travel experiences, ChatGPT may provide tailored travel recommendations, such as recommendations for potential trip destinations, comparable activities, and tourism attractions. Such guidance can enhance travelers' experiences and assist them in more efficiently planning their forthcoming trips.

Trip evaluation and advice. To gather information about their experiences and feedback and to provide applicable recommendations, ChatGPT may talk with travelers about their voyages. It helps tourists summarize their trip experiences, offers insightful commentary, and serves as a resource for other tourists.

Using ChatGPT throughout the pre-trip, during-trip, and post-trip phases, tourists can receive more individualized support that improves their capacity for decision-

making and elevates the entire travel experience [17]. It provides tailored suggestions to increase the value of a trip and aids travelers in making decisions.

4. ChatGPT implementation system

The implementation process of the ChatGPT system in the tourism industry is complex, covering various aspects such as data collection-user interface design-deployment, and operation process-user feedback–prompt strategies (refer to **Figure 2**).

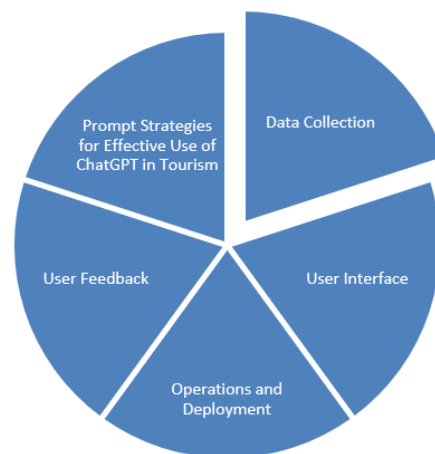


Figure 2. ChatGPT implementation system.

4.1. Data collection

Tourism data must be used as training data to create an accurate ChatGPT [36]. The data can cover travel destinations, activities, meals, means of transportation, accommodations, and travel experiences. Social media platforms, including blogs, social networks, and travel websites, can all be used to collect it. For a full and impartial assessment to be offered, the raw data must be accurate and diverse.

4.2. User interface

The ChatGPT interface should be simple, straightforward, and easy to use to enhance the user experience. The user interface needs to enable communication with the bot, enabling users to make hotel or flight reservations, ask questions, and receive travel advice. The interface may also have visualization components like images, videos, or maps.

4.3. Operations and deployment

Before being used, the ChatGPT system must be created and tested. The system's functionality and the trained model's integration with the user interface are tested. Additionally, it is crucial to ensure the system is secure and reliable to manage user traffic during peak times and safeguard user privacy.

4.4. User feedback

According to Wu, He [12], the ChatGPT system can be improved with user feedback. Users can be encouraged to discuss their system usage and recommendation experiences by providing them with feedback channels. This feedback can increase the system's functioning, correct faults, and improve the accuracy of the system's responses.

4.5. Prompt strategies for effective use of ChatGPT in tourism

An essential aspect of implementing ChatGPT effectively in the tourism industry is the strategic use of prompts. Prompts are the questions or instructions that guide ChatGPT in generating useful and relevant responses. To maximize ChatGPT's potential for delivering accurate, context-specific, and engaging information to users, tourism practitioners can adopt the following strategies for crafting effective prompts:

Be clear and specific. Precise prompts improve ChatGPT's accuracy and relevance. For instance, instead of asking, "Tell me about the destination," users may receive more targeted responses by specifying, "What are the top historical sites in [City] for cultural exploration?"

Incorporate contextual information. Providing background or situational details in the prompt helps ChatGPT tailor its responses. A prompt like, "Suggest local dining options for a family with children near [Landmark] in the evening," yields more refined recommendations than a general request for restaurant options.

Use follow-up prompts for complex queries. Complex topics may require layered questions. After an initial prompt like, "What are the popular activities in [Destination]?", follow-up prompts could include, "Which of these activities are family-friendly?" or "Can you suggest eco-friendly options?"

Leverage temporal prompts. Given the importance of up-to-date information in travel, temporal prompts can enhance relevance. Asking, "What events are happening in [City] this month?" or "What are the current travel restrictions in [Country]?" ensures the generated information is timely.

Experiment with prompt variations. Different phrasing can yield diverse insights. Tourism practitioners are encouraged to test multiple ways of asking similar questions, such as "What should a first-time visitor see in [City]?" versus "What are must-visit attractions for new tourists in [City]?"

Incorporate user intentions and preferences. By embedding user-specific intentions, such as "Suggest scenic hiking spots in [Destination] for beginner hikers," ChatGPT can tailor responses more closely to individual needs, enhancing the user experience.

By utilizing these prompt strategies, tourism practitioners can ensure that ChatGPT delivers responses that are aligned with user expectations and specific tourism scenarios. This approach maximizes ChatGPT's effectiveness as a tool for personalized, context-aware, and dynamic engagement in tourism.

Several difficulties may be encountered when implementing the ChatGPT system for tourism.

- (1) Data quality and accuracy. It is crucial to ensure the high quality and accuracy of the collected data. Natural language processing technology can screen and certify the data through manual scrutiny.
- (2) Continuous updating and maintenance of knowledge. Tourism information changes frequently, so it is essential to ensure that the ChatGPT system has a timely knowledge base. It does this by frequently updating the information.
- (3) Diversification of user needs. Due to individual differences in tourism needs, the ChatGPT system is required to adapt to the requirements of different users. Personalized recommendations and customized delivery can be used in combination with each other.

5. ChatGPT impact on tourist behavior

ChatGPT technology creates business opportunities and markets competitive advantages for tourism enterprises while providing travelers with personalized real-time tourism consulting services to enhance traveler satisfaction and loyalty.

Its effects on tourists' behavior are shown as follows:

5.1. Tourist experience improvement

Compared to traditional travel advisory methods, ChatGPT technology can more accurately understand the needs of travelers and provide customized recommendations based on travelers' personal preferences [37]. By talking to ChatGPT, travelers can get the travel information they need without spending time searching for and sifting through massive amounts of information on various websites and platforms. This personalized and interactive service dramatically enhances the tourist experience.

In addition, ChatGPT can continuously learn and improve its service quality based on travelers' feedback and evaluation. Through analyzing historical conversation records and user evaluations, ChatGPT continuously optimizes its answers' accuracy and intelligence to meet travelers' requirements better. Therefore, ChatGPT must improve over time, bringing tourists more beautiful feelings.

5.2. Influencing purchase decision

ChatGPT system provides tourists with more information and recommendations for tourism products and services, which positively affects tourists' purchasing decisions [17]. In interacting with ChatGPT, travelers can get other travelers' evaluations and recommendations on different scenic spots, restaurants, and hotels to better understand each option's advantages and disadvantages. This personalized, real-time travel advisory service lets travelers make purchasing decisions.

Travelers can also be alerted to special offers and discounts when they talk to ChatGPT, which can help travelers get a better price for their purchases by recommending specials and packages that meet their needs and budget. Travelers may make more informed selections about their purchases thanks to customized suggestions and current promotional information.

5.3. Enhanced competitive advantage

ChatGPT technology can bring a competitive advantage to the tourism industry [38]. Tourism companies such as travel agencies, hotels, and tourist attractions can attract more tourists by providing personalized services and instant interactive experiences. ChatGPT system can automatically process service requests, reducing the burden of human customer service and saving time and resources. Organizations can apply human resources in high-value work to improve operational efficiency and quality. At the same time, the ChatGPT system's efficiency helps attract more visitors, increase visitor traffic, and improve profitability.

5.4. Intelligent self-service

ChatGPT technology can also be used for intelligent self-service [39]. Tourists can interact with ChatGPT to independently complete various travel services, such as self-service flight booking, hotel check-in processing, and attraction guiding. This self-service can improve convenience and efficiency for tourists while reducing the stress tourism workers face.

6. Ethical issues

Privacy protection, data security, algorithmic bias, disinformation, and technological challenges are some of the dilemmas and challenges faced by ChatGPT in its application within the tourism industry. To minimize ethical and practical issues and ensure ChatGPT's usefulness and reliability, adopting appropriate solutions and investing in continuous technological improvements are essential.

6.1. Privacy protection

In the travel industry, ChatGPT may handle users' sensitive information, such as names, contacts, travel history, and payment details [40]. For example, when tourists use ChatGPT to book accommodations or share preferences for personalized itineraries, personal data storage and access control become crucial. Measures to protect user privacy should include advanced encryption protocols and secure data storage, as well as clear policies on data use. Furthermore, obtaining user consent before processing their data is essential for maintaining trust with data protection regulations.

6.2. Data security

The reliance on ChatGPT applications on large volumes of training data, including travelers' plans and preferences, raises data security concerns [41]. For instance, if ChatGPT is used by tourism companies for itinerary planning, it may store details like travel routes, hotel preferences, and activity bookings, which, if compromised, could expose tourists to identity theft or unauthorized use of their travel information. To ensure data security, multi-layered protection measures should be employed, including encryption during data transmission and storage, restricted access to sensitive data, and regular security audits to detect vulnerabilities.

6.3. Algorithm bias

Algorithmic bias is a concern in ChatGPT applications due to the potential limitations in training data, which could lead to biased recommendations [41]. For instance, ChatGPT may prioritize popular destinations or recommend mainstream hotels and restaurants over smaller, locally owned establishments due to biased data patterns, thus disadvantaging less-represented regions or services. Addressing this issue requires diversifying training data and ensuring fair representation of different destinations and service types. Additionally, ongoing review processes with human evaluators can help identify and correct biased responses, promoting fair tourism recommendations.

6.4. False information

The potential for ChatGPT to provide misleading or outdated information poses a risk in the tourism sector. Inaccurate responses, such as incorrect travel advisories, COVID-19 restrictions, or misrepresentation of local customs, could impact travelers' plans and experiences negatively [42]. Enhancing the detection and filtering of false information is essential, which can be achieved by combining artificial intelligence tools with human review to verify the content. Providing accurate, up-to-date sources and citations alongside ChatGPT's responses can help guide user judgment and ensure information reliability.

6.5. Technological challenges

The ChatGPT model faces technical limitations in accurately understanding and addressing the complexities of the tourism industry [43]. For example, tourism data is dynamic, with frequent updates to travel advisories, seasonal events, and accommodation options. ChatGPT may struggle to provide real-time updates on such information, which could lead travelers to rely on outdated recommendations. To overcome this, integrating domain-specific training and regularly updating ChatGPT's knowledge base is necessary to improve its accuracy. Collaboration with tourism professionals can further enhance ChatGPT's responses by providing industry insights that better align with tourists' evolving needs. Additionally, gathering user feedback can help refine responses and identify gaps in the technology's understanding of complex, tourism-specific scenarios.

7. Research recommendation

This section outlines targeted research recommendations aimed at maximizing ChatGPT's effectiveness in the tourism sector. To achieve this, **Table 2** summarizes each research goal, expected outcomes, and suitable methodologies, helping to guide future studies on improving user experiences, exploring technology integrations, assessing competitive advantages, and analyzing visitor feedback.

Table 2. Summary of research goals, expected outcomes, and suggested methodologies.

Research Recommendation	Expected Outcome	Suggested Methodology
Study the impact of ChatGPT on tourists' experience	Improved understanding of ChatGPT's effect on convenience, interactivity, and satisfaction	Surveys, Interviews, Observations
Examine ChatGPT's collaboration with other technologies.	Frameworks for integration with AR, machine vision, etc.	Case Studies, Experimental Research
Explore ChatGPT's role in competitive advantage.	Insight into business model adaptations and market shifts	Market Analysis, Comparative Studies
Research interaction between ChatGPT and human tour guides	Defined roles and optimized tourist experiences	Field Observations, Mixed-Method Analysis
Analyze visitor feedback with ChatGPT.	Enhanced data-driven insights on visitor satisfaction	Sentiment Analysis, Data Mining

(1) Study the impact of ChatGPT on tourists' experiences.

Future research can utilize quantitative and qualitative methods to explore the positive and negative impacts of ChatGPT on tourists' experiences in the tourism industry, including convenience, interactivity, and satisfaction.

Convenience. Investigate the practicality of offering travel advice, responding to inquiries, and making service reservations through ChatGPT. Examine whether users can save time and energy by quickly and accurately obtaining the necessary information.

Interactivity. Study the interactive impacts of ChatGPT in interactions with visitors. Assess factors such as response speed, communication fluidity, and naturalness of interaction with visitors.

Satisfaction. Evaluate users' feelings about using ChatGPT and assess if the services provided by ChatGPT meet their expectations and needs. This can be done through surveys, in-depth interviews, or onsite observations.

(2) Examining ChatGPT's potential for collaboration with other technologies

To give travelers a more thorough and varied travel experience, future research should concentrate on integrating ChatGPT with augmented reality, machine vision, and other technologies.

Combining image processing with methods used in computer vision. Examine how ChatGPT uses machine vision technology to identify and assess visual elements, including buildings, structures, and works of art. Visitors will be able to enjoy magnificent landscapes more clearly and immerse themselves using visual aids through intelligent devices thanks to this integration.

Augmented reality. Create a virtual guide experience by combining ChatGPT with augmented reality technologies. Enable visitors to communicate and engage with a real tour guide through virtual tour guide imagery using cell phones or wearable technology. This combination offers travelers an immersive experience, allowing them to learn more about tourist destinations, history, and culture at their convenience.

(3) Examining the role of ChatGPT in enhancing competitive advantage in the tourism industry

Future research can analyze ChatGPT's use in the tourism industry on the competitive landscape and business models. This research can assess the contributions and challenges of ChatGPT in creating a competitive advantage for companies.

Alterations in the market and business models. Investigate ChatGPT's position and effects in the highly competitive tourism market. Examine whether the introduction of ChatGPT has changed the business environment for competitors and how it has impacted travel companies' business strategies. This analysis may include the role played by ChatGPT in providing adequate customer support and tailored suggestion services.

Evaluating competitive advantage. Determine how much ChatGPT has helped travel agencies gain a competitive edge. Quantify the impact of ChatGPT on a company's competitive advantage by comparing variables such as market share and customer satisfaction between businesses that utilize ChatGPT and those that do not.

Persistent innovation and challenges. Explore the difficulties and limitations of ChatGPT in the context of ongoing innovation in the tourism sector. This investigation may include concerns about the cost of implementing new technology, the security and privacy of personal data, and compliance with AI's ethical and legal framework.

(4) Study the interaction and cooperation between ChatGPT and human tour guides.

Future research can explore the methods and effects of seamlessly integrating ChatGPT with human tour guides to enhance the tourist experience.

Interaction patterns between human tour guides and ChatGPT. Investigate the different modes of interaction, including voice conversations, text chats, and other forms of communication between ChatGPT and live tour guides. Scrutinize the efficiency and user experience of these interactions to assess the effectiveness of ChatGPT when working alongside tour guides.

The role of ChatGPT in tour guide services. Examine the specific functions of ChatGPT in tour guide services, such as providing background information, frequently answering questions, and suggesting itineraries. Clearly define the roles of ChatGPT and human tour guides to understand how they complement each other in delivering tour guide services.

(5) Research using ChatGPT to examine visitor feedback and remarks.

Learn how ChatGPT may be used to analyze visitor comments and feedback data and extract insightful and valuable information that will help the tourism industry provide higher-quality goods and services.

Use ChatGPT to examine visitor feedback. Examine the use of ChatGPT for evaluating visitor review data. Consider strategies like sentiment analysis, keyword extraction, subject recognition, and ChatGPT model optimization to assess and comprehend visitor data accurately.

Obtaining valuable data. Examine the most effective strategies for obtaining the essential information and insights from visitor reviews and feedback utilizing ChatGPT. Use ChatGPT's analysis tools to find possible problems and areas for improvement and gauge visitor satisfaction and requirements and preferences for products and services.

Methods for improving services. Develop plans for the travel industry to improve its products and services based on a thorough grasp of visitor comments and preferences by examining the data and insights supplied by ChatGPT.

8. Limitations and future research directions

While this study provides an in-depth analysis of ChatGPT's applications, benefits, and challenges in the tourism industry, several limitations should be acknowledged to provide a balanced perspective and guide future research.

(1) Scope of Data Sources

The study relies on existing literature, which may not comprehensively capture the full range of ChatGPT applications in tourism. Future research could include primary data collection through surveys or interviews with industry professionals and tourists to gather firsthand insights on ChatGPT's effectiveness and limitations in real-world settings.

(2) Potential for Algorithmic Bias

Although this study addresses algorithmic bias, it is challenging to measure the extent and impact of bias without in-depth empirical testing. ChatGPT's responses are influenced by training data, which may lead to bias. Future studies could conduct empirical analyses to examine bias patterns and explore techniques to mitigate such biases in tourism-specific applications.

(3) Evolving Nature of AI Technology:

As AI technology and ChatGPT models continue to evolve rapidly, this study's findings may soon be influenced by advances in language processing capabilities, ethical regulations, and user expectations. Longitudinal studies that assess ChatGPT's impact over time would be valuable for capturing these changes and evaluating the model's adaptability to the tourism industry.

(4) Limited Focus on Cross-Cultural Interactions:

This study primarily addresses the general application of ChatGPT in tourism without exploring cross-cultural differences, which can be crucial in a global tourism context. Future research could focus on ChatGPT's effectiveness in different cultural contexts to understand how language nuances and cultural expectations impact its utility in diverse tourism markets.

(5) Ethical and Privacy Concerns:

While this study discusses ethical issues like privacy and data security, further research is needed to explore travelers' attitudes and concerns regarding data use and privacy in AI-driven tourism applications. Future research could involve surveys or experimental designs to better understand travelers' perceptions of privacy and trust in ChatGPT applications.

In recognizing these limitations, this study provides a foundation for ongoing research in AI-driven tourism. Addressing these constraints in future studies will deepen our understanding of ChatGPT's role and potential in enhancing tourism experiences, guiding both researchers and practitioners toward responsible and effective implementations.

9. Conclusion

This study offers a comprehensive examination of ChatGPT's potential to transform the tourism industry by enhancing personalized tourism experiences, improving destination image, and facilitating real-time tourist interactions. By analyzing ChatGPT's application scenarios, implementation processes, and the ethical

and technological challenges associated with its use, we have identified several key insights and implications for both researchers and practitioners in the tourism field.

Key takeaways and implications for practitioners.

- (1) **Enhanced Customer Service and Personalization:** ChatGPT's ability to deliver real-time, context-sensitive responses offers tourism businesses a valuable tool for enhancing customer satisfaction. Practitioners can leverage ChatGPT to provide 24/7 support, personalized travel recommendations, and automated responses to common inquiries, thereby freeing human resources for higher-value interactions. This personalized service can improve customer loyalty and brand competitiveness.
- (2) **Efficiency Gains and Cost Reductions:** The automation potential of ChatGPT provides opportunities for cost savings by reducing the reliance on human agents for routine customer service tasks. Tourism operators can incorporate ChatGPT into various operational areas, including virtual tours, itinerary planning, and language translation services, to streamline processes, minimize costs, and deliver consistent service quality across locations.
- (3) **Ethical and Data Management Considerations:** The study highlights the importance of implementing data privacy and security measures. Practitioners must be vigilant in ensuring data protection, securing users' personal information, and addressing algorithmic biases to provide equitable, accurate, and trustworthy recommendations. Ethical data handling practices are critical to building and maintaining customer trust in AI-driven services.

Implications for researchers and future research directions.

- (1) **Focus on Bias and Fairness:** Future research should examine ways to mitigate biases in ChatGPT's responses, especially given the diverse range of destinations and services in tourism. Researchers can investigate methods to ensure that AI systems like ChatGPT provide fair representation across different regions, service providers, and cultural experiences, supporting inclusivity within tourism AI applications.
- (2) **Integration with Emerging Technologies:** Researchers should explore the integration of ChatGPT with technologies such as augmented reality (AR), geolocation services, and Internet of Things (IoT) devices to offer tourists immersive and contextually relevant experiences. This integration could help travelers engage with destinations, increasing satisfaction and enhancing the tourism experience.
- (3) **Ethical Framework Development:** Given the ethical concerns identified, including data privacy, misinformation, and algorithmic bias, there is a need for research that develops ethical frameworks tailored to the tourism sector. Such frameworks would help guide the responsible implementation of AI technologies, ensuring that they meet both user expectations and industry standards.
- (4) **Longitudinal Studies on Impact:** Future studies could conduct longitudinal analyses of ChatGPT's influence on traveler behavior, satisfaction, and trust over time. These studies would provide valuable insights into the sustained effects of AI-powered tourism assistance and offer guidance for adapting AI solutions to meet evolving traveler needs.

By addressing these areas, future research can further validate ChatGPT's role in tourism, while practical implementations can leverage its strengths to deliver improved service experiences, operational efficiencies, and competitive advantages. This study thus serves as a foundation for ongoing exploration and development of AI technologies within the tourism industry to enhance both theoretical understanding and practical outcomes.

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