Embracing the ChatGPT revolution: Embracing the ChatGPT unlocking new horizons for tourism

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Abstract

Purpose – This study aims to investigate tourists' attitudes and intentions regarding the usage of Chat Generative Pre-trained Transformer (ChatGPT) for accessing tourism information. Furthermore, by integrating the perceived risks associated with ChatGPT and the theory of planned behavior (TPB), this research examines the impact of three types of perceived risks, such as privacy risk, accuracy risk and overreliance risk, on tourists' behavioral intention.

Design/methodology/approach – Data were gathered for this study by using two online survey platforms, thus resulting in a sample of 536 respondents. The online survey questionnaire assessed tourists' perceived risks, attitude, subjective norm, perceived behavioral control, behavioral intention and demographic information related to their usage of ChatGPT.

Findings – The structural equation modeling analysis revealed that tourists express concerns about the associated risks of using ChatGPT to search for tourism information, specifically privacy risk, accuracy risk and overreliance risk. It was found that perceived risks significantly influence tourists' attitude and intention toward the usage of ChatGPT, which is consistent with the hypotheses proposed in previous literature regarding tourists' perceived risks of ChatGPT.

Research limitations/implications - This work is a preliminary empirical study that assesses tourists' behavioral intention toward the use of ChatGPT in the field of tourism. Previous research has remained at the hypothetical level, speculating about the impact of ChatGPT on the tourism industry. This study investigates the behavioral intention of tourists who have used ChatGPT to search for travel information. Furthermore, this study provides evidence based on the outcome of this research and offers theoretical foundations for the sustainable development of generative AI in the tourism domain. This study has limitations in that it primarily focused on exploring the risks associated with ChatGPT and did not extensively investigate its range of benefits.

Practical implications - First, to address privacy concerns that pose significant challenges for chatbots various measures, such as data encryption, secure storage and obtaining user consent, are crucial. Second, despite concerns and uncertainties, the introduction of ChatGPT holds promising prospects for the tourism industry. By offering personalized recommendations and enhancing operational efficiency, ChatGPT has the potential to revolutionize travel experiences. Finally, recognizing the potential of ChatGPT in enhancing customer service and operational efficiency is crucial for tourism enterprises.

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ChatGPT

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Social implications – Recognizing the potential of ChatGPT in enhancing customer service and operational efficiency is crucial for tourism enterprises. As their interest in adopting ChatGPT grows, increased investments and resources will be dedicated to developing and implementing ChatGPT solutions. This enhancement may involve creating customized ChatGPT solutions and actively engaging in training and development programs to empower employees in effectively using ChatGPT's capabilities. Such initiatives can contribute to improved customer service and overall operations within the tourism industry.

Originality/value – This study integrates TPB with perceived risks in ChatGPT, thus providing empirical evidence. It highlights the importance of considering perceived risks in tourists' intentions and contributes to the sustainable development of generative AI in tourism. As such, it provides valuable insights for practitioners and policymakers.

Keywords ChatGPT, Generative AI, Information, Perceived risk, Theory of planned behavior (TPB)

Paper type

迎接ChatGPT革命:开启旅游新视界

摘要

研究目的 – 本研究旨在调查游客对使用ChatGPT获取旅游信息的态度和意向。此外,通过将与 ChatGPT相关的感知风险与计划行为理论(TPB)相结合,本研究探讨了三种感知风险(隐私风险、 准确性风险和过度依赖风险)对游客行为意向的影响。

研究方法 – 本研究通过两个在线调查平台收集了536名受访者的数据。在线调查问卷评估了游客对 ChatGPT使用的感知风险、态度、主观规范、感知行为控制、行为意向以及与其使用ChatGPT相关 的人口统计信息。

研究发现 – 结构方程建模分析显示, 游客对使用ChatGPT搜索旅游信息的相关风险表示关切, 特别是 隐私风险、准确性风险和过度依赖风险。发现感知风险显著影响游客对使用ChatGPT的态度和意向, 与先前有关游客对ChatGPT感知风险的文献中提出的假设一致。

研究创新 – 本研究将TPB与ChatGPT中的感知风险相结合,提供了实证证据。它强调了在考虑游客意向时考虑感知风险的重要性,并为旅游中生成AI的可持续发展提供了贡献。因此,它为从业者和政策制定者提供了宝贵的见解。

关键词 ChatGPT, 生成AI, 信息, 感知风险, 计划行为理论 (TPB)

文章类型 研究型论文

1. Introduction

In this era of information consumption, constant evolution exists in the tourism industry with the emergence of new trends and technologies (Lee *et al.*, 2023; Park *et al.*, 2023). Among these advances, generative artificial intelligence (AI) stands out as a technology that will significantly affect the tourism industry (Dogru *et al.*, 2023a; Garcia, 2023; Gursoy *et al.*, 2023). Researchers exhibit a mix of excitement and apprehension regarding the transformative potential of generative AI such as Chat Generative Pre-trained Transformer (ChatGPT; Carvalho and Ivanov, 2023; Jo, 2023; Van Dis *et al.*, 2023).

Since ChatGPT was released in November 2022, discussions about ChatGPT have continued without pause. Several studies have already suggested that this technology can have a profound impact on tourism (Carvalho and Ivanov, 2023; Dwivedi *et al.*, 2023; Gursoy *et al.*, 2023; Harahap *et al.*, 2023; Mich and Garigliano, 2023). ChatGPT represents a significant evolution from traditional chatbots in the tourism domain. Unlike rule-based chatbots, which have limited flexibility and domain specificity, ChatGPT leverages advanced machine learning to offer dynamic, adaptable responses across a broad range of topics (Panda and Kaur, 2023). This technology not only reduces the time and effort required for manual training but also simulates human-like interactions, thus enhancing user engagement. Moreover, ChatGPT's continuous learning capability ensures that its responses remain up to date; as such, it

alleviates the need for frequent manual updates that are characteristic of conventional chatbots (Panda and Kaur, 2023).

Obviously, ChatGPT has its own unique strengths while simultaneously posing certain risks. According to previous research (Carvalho and Ivanov, 2023; Jo, 2023; Mich and Garigliano, 2023; Van Dis *et al.*, 2023), ChatGPT presents certain risks and limitations in the tourism industry. First, inaccurate or false content may be produced. Empirical studies in the academic field have shown that ChatGPT provides erroneous information and data (Jo, 2023; Van Dis *et al.*, 2023). In some instances, ChatGPT has also offered incorrect or inaccurate travel information in the context of planning travel itineraries (Pitrelli, 2023). Second, personal data and privacy breaches have posed a threat. The development of ChatGPT by OpenAI faced an admitted data breach issue on March 24, 2023, wherein certain users were able to view other users' chat history (OpenAI, 2023a). This incident raised concerns among ChatGPT users regarding the potential leakage of personal data. Thirdly, overreliance on AI may lead to tourists losing their ability to make personal judgments (Carvalho and Ivanov, 2023).

To fill this research gap, a conceptual model with the backdrop of theory of planned behavior (TPB), was developed to test different dimensions of perceived risks with other variables in the context of ChatGPT. Motivated by the concerns regarding ChatGPT in society and media, the current study aims to understand whether perceived risks are related to ChatGPT and tourists' intention to use it to search for tourism information. This study investigated the effects of privacy risk, accuracy risk and overreliance risk on tourists' behavioral intention (BI) toward ChatGPT by integrating the perceived risk (PCR) of ChatGPT with the TPB. To achieve this goal, the present study proposes the following research questions:

- *RQ1*. How do PCRs (i.e., privacy, accuracy and overreliance) impact tourists' intentions to use ChatGPT for travel information?
- *RQ2.* How does TPB explain the influence of PCRs on tourists' adoption of ChatGPT for travel planning?

TPB suggests that an individual's BI is directly influenced by motivational factors (Ajzen, 1985, 1991). Therefore, this theory is a fitting framework for understanding tourist behaviors in this context. Recent empirical studies in tourism and hospitality (e.g. Cho and Jeon, 2023; Hwang *et al.*, 2023; Leong and Koay, 2023) reinforce the effectiveness of TPB in predicting behavioral intentions based on attitudes shaped by motivations and constraints. This confirmed effectiveness aligns with our objective of gaining insights into tourist decision-making processes.

The findings contribute to the understanding of ChatGPT's potential applications for the sustainable growth of the tourism industry in the context of AI. Furthermore, this study emphasizes the urgent need to address privacy concerns and improve information accuracy in ChatGPT, thus providing a basis for future research on ChatGPT in the tourism industry. To the best of the authors' knowledge, this study might be the first one to investigate travelers' perceptions when using ChatGPT for searching travel information.

2. Literature review

2.1 Generative artificial intelligence and Chat Generative Pre-trained Transformer

Generative AI, which encompasses unsupervised and semi-supervised machine learning, has revolutionized content creation in various domains, including tourism, with outputs often being indistinguishable from human-generated content (Dwivedi *et al.*, 2023). Within this field, generative adversarial networks (GANs) and GPTs are notable frameworks.

GANs involve two neural networks for creating and validating synthetic data (Baidoo-Anu and Owusu Ansah, 2023). Meanwhile, GPTs, which leverage extensive data, excel in natural language processing, thus being able to produce text resembling human conversation (Hu, 2022).

ChatGPT, which was developed by OpenAI, is an AI chatbot based on the GPT framework, a powerful type of large language model that uses deep learning techniques to produce text that closely mimics human conversation. Currently, OpenAI has released version GPT-4, which can receive text and image inputs and output human-like text. GPT-4 exhibits enhanced reliability and creativity compared with its predecessors, thus demonstrating improved proficiency in comprehending and executing nuanced instructions (OpenAI, 2023b).

Within the tourism industry, major players such as Malaysia Airlines and Kayak have integrated chatbots into online platforms, including Facebook Messenger and WhatsApp, which has enhanced customer interaction (Ali *et al.*, 2023a; Loureiro *et al.*, 2022). However, ChatGPT represents a significant leap beyond these conventional chatbots by offering notable advantages in operational efficiency, user experience and customer service (Ali *et al.*, 2023a; Carvalho and Ivanov, 2023; Mich and Garigliano, 2023). For instance, it facilitates self-service options, efficient handling of customer conversations and personalized interactions, including language translation and itinerary creation. This advancement is evident in Expedia's integration of a beta ChatGPT for real-time travel advice through WhatsApp and Instagram (Ali *et al.*, 2023a). The emergence of ChatGPT has marked a transformative phase in AI applications in tourism as it shifts from a niche interest to a leading AI chatbot (Gursoy *et al.*, 2023).

2.2 Perceived risk (PCR) of Chat Generative Pre-trained Transformer in tourism

The concept of risk is recognized as significant in economic activities (Knight, 1921). Subsequently, the tourism field has extensively explored the notion of PCR (Lepp and Gibson, 2003), and the integration of PCR and TPB has been substantiated through empirical research (Quintal *et al.*, 2010).

Recent research has explored the risks associated with ChatGPT for users and tourists (Carvalho and Ivanov, 2023; Jo, 2023; Mich and Garigliano, 2023; Rivas and Zhao, 2023; Van Dis *et al.*, 2023). The findings are summarized as follows.

These risks include the potential for generating inaccurate or ethically questionable information because of ChatGPT's reliance on diverse internet data sets and user interactions (Mich and Garigliano, 2023; Van Dis et al., 2023). In addition, previous versions have notable timeliness issues, which were addressed to some extent by ChatGPT Plus's introduction of internet connectivity in May 2023 (OpenAI, 2023c; Rivas and Zhao, 2023). However, concerns persist regarding the paid membership for Plus and limited plugin usage. Another significant risk involves privacy. ChatGPT's learning mechanism requires extensive personal data collection, thus raising concerns about unpredictability, transparency and ethical clarity in AI (Carvalho and Ivanov, 2023; Gursoy et al., 2023; Rivas and Zhao, 2023). OpenAI's recent data breach further exacerbates these privacy concerns (OpenAI, 2023a). Additionally, overreliance on ChatGPT can diminish the social and emotional aspects of the tourism experience, which can lead to a sense of isolation and emotional detachment among tourists (Carvalho and Ivanov, 2023; Gursoy et al., 2023; Rivas and Zhao, 2023). Considering the potential PCR that tourists may encounter when using ChatGPT to search for travel information, this study incorporates three types of PCR (i.e., privacy risk, accuracy risk and overreliance risk).

2.3 Theory of planned behavior (TPB)

TPB, which was introduced by Ajzen (1985), is an established model for understanding human behavior. It is particularly useful in predicting BI based on attitude (ATT), subjective norm (SN) and perceived behavioral control (PBC). In the context of tourism, TPB has been empirically validated to explain tourist behaviors and decision-making processes (Lee *et al.*, 2020; Saxena *et al.*, 2023; Zorlu *et al.*, 2022). It highlights the significance of ATT (individuals' evaluation of ChatGPT), SN (perceived social pressures) and PBC (perceived ease or difficulty of using ChatGPT) in influencing users' intentions to use ChatGPT for travel information. ATT is critical in forming users' acceptance of ChatGPT, SN captures the influence of social circles and PBC assesses the perceived ease of use. Together, they shape the likelihood of ChatGPT adoption in the tourism industry. Overall, the TPB offers valuable insights into tourists' behavior regarding ChatGPT in the tourism context.

2.4 Relationships between PCR and components of theory of planned behavior

Previous researchers integrated PCR into the TPB framework has been acknowledged and used in diverse domains. Notably, the TPB structures have received substantial validation in the context of tourism (e.g. Girish *et al.*, 2022; Lee *et al.*, 2020). Accordingly, the current study focuses on investigating the impact of PCR and its implications within the TPB framework.

Previous research has demonstrated the negative effect of PCR on the constructs of TPB (e.g. Lee, 2009; Liao et al., 2010; Xie et al., 2017). Given the uniqueness of ChatGPT, experts must continue to investigate the connections between the PCR associated with chatbots or AI and the constructs of TPB, as highlighted in prior research. Specifically, Kasilingam (2020) examined customers' desire to purchase using chatbots on smartphones, thus revealing a significantly negative effect of PCRs on ATT toward chatbots. Saxena et al. (2023) also found evidence of the negative effect of PCRs on ATT in a survey assessing bank customers' perceptions of AI-driven chatbots. Similarly, Pillai et al. (2023) emphasized the negative influence of PCRs on ATT in a study investigating employees' adoption of chatbots with AI. In a study on the adoption of electronic services by Featherman and Fuller (2003), SN as a social influence was emphasized, thus highlighting that higher PCR reduces SN. Moreover, one study examined the factors influencing purchase intention for bottled water in online strategies. Guo et al. (2021) found empirical evidence supporting the detrimental effect of PCR on ATT, SN and PBC. The findings emphasized that PCR plays a significant role in undermining users' planned behavior, thereby providing robust theoretical support for the present study. Xie et al. (2017) demonstrated in a survey on citizens' adoption of e-government behaviors that PCR significantly negatively influences PBC. According to TPB (Ajzen (1985), ATT, SN, and PBC are antecedents of BI. Lee (2009) emphasized that ATT, SN, and PBC positively impact users' BI to use online banking services. Similarly, Girish et al. (2022) highlighted that ATT, SN, and PBC positively affect tourists' BI to visit travel bubble destinations. Hence, the following hypotheses are proposed:

- H1. PCR negatively affects ATT.
- H2. PCR negatively affects SN.
- H3. PCR negatively affects PBC.
- H4. ATT positively affects BI.
- H5. SN positively affects BI.
- H6. PBC positively affects BI.

IHTT 2.5 Direct relationship between PCR and BI

In predicting the continued usage intention of AI-based chatbots in tourism, risks associated with adopting new technology have emerged (Zhang *et al.*, 2023). BI, a reliable predictor of actual behavior, is closely linked to attitudes toward specific actions (Ajzen and Fishbein, 1977; Kim *et al.*, 2020). As mentioned in previous studies, a range of perceived risks related to ChatGPT can directly influence tourists' BI (Carvalho and Ivanov, 2023; Mich and Garigliano, 2023).

In tourism, prior research has consistently highlighted the direct relationship between PCR and BI. For instance, Kim *et al.* (2020) found a negative correlation between PCR and BI in tourist decision-making, which is parallel to the findings in studies using the UTAUT2 model to assess BI toward AI virtual assistants (García de Blanes Sebastián *et al.*, 2022). These observations consistently illustrate the substantial influence of PCR on the adoption and continued usage of AI-based technologies in tourism. Hence, the following hypotheses are proposed:

H7. PCR negatively affects BI.

Using the aforementioned ideas as a foundation, this study suggested the conceptual model depicted in Figure 1.

3. Methods

3.1 Measures

The measures in the study were developed with the support of previous studies and a thorough literature review. The three factors that make up PCR (privacy risk, accuracy risk, and overreliance risk each consist of three items which were derived from prior research (Carvalho and Ivanov, 2023; Marjerison *et al.*, 2022; Sok and Heng, 2023). A total of 14 measurement items for the TPB were modified from earlier research (Han *et al.*, 2010;



Figure 1. Conceptual model



Kao and Huang, 2023; Leung and Jiang, 2018). All items were scored on a seven-point Likert scale (1 = totally disagree, 7 = totally agree). Primarily, a pretest was conducted among 50 Chinese internet users to ensure clarity of expression and measurement reliability. Based on the pretest results, it was found that Cronbach's alpha values were above the critical threshold value of 0.7. Furthermore, minor revisions to the questionnaire were made based on participants' feedback associated with the clarity of wording of the items.

3.2 Sample and data collection

Data were collected in May 2023 from visitors who used ChatGPT to search for travel information. Specifically, a convenience sampling method was used to invite tourists who had used ChatGPT to search for travel information to participate in the online survey. Initially, participants were informed about the purpose of the study and its anonymous nature. Subsequently, they were shown a screenshot depicting an inquiry made using ChatGPT to search for tourism information, which read, "User: Please provide information about tourist attractions in Beijing and create a one-day travel itinerary for Beijing". ChatGPT then provided a plan and recommendations for a one-day tour in Beijing based on the query. Participants used ChatGPT's responses as a foundation, and we presented them with questionnaires regarding PCR, ATT, SN, PBC and BI. Online survey platforms were used to acquire the data, namely, Questionnaire Star and Credamo, which collectively own a database of over 5.6 million online samples. To ensure that respondents had indeed used ChatGPT for searching travel information, the screening question "Have you used ChatGPT when gathering information related to tourism activities?" was used to identify eligible respondents. As a result, 550 questionnaires were collected, of which 14 were possible outliers with incomplete responses. The final analysis used 536 questionnaires. A sample size of 536 was considered appropriate to test the proposed model using structural equation modeling (SEM). The ratio of cases to free parameters in this study is 9.6:1, which exceeds the SEM recommended threshold of 5:1 (Kline, 2005).

3.3 Data analysis

A two-stage approach was used to examine the collected data: the statistical analyses for this study involved confirmatory factor analysis (CFA) and SEM using SPSS 25.0 and AMOS 26.0. CFA was employed to evaluate the measurement model, whereas second-order analysis was conducted to help explain the interpretation of results and identify the factors of PCR (Gustafsson and Balke, 1993). Subsequently, SEM was used to examine the causal links between PCR and TPB constructs and validate the hypotheses posited in the research model.

4. Results

4.1 Demographic profile

In Table 1, the data revealed that a larger percentage of female respondents (58.8%) participated in the study than males (41.2%). A majority of participants (87.1%) were aged between 20 and 39. In terms of educational background, a significant proportion (85.0%) held a bachelor's degree or higher. Additionally, white-collar occupations accounted for more than half of the respondents' vocations.

4.2 Common method bias and data non-normality

Several steps were implemented to address common method biases (CMB) in this study. Participants were informed about the purpose of the research and assured of the confidentiality of their responses, thus reducing social desirability bias. The survey items, which were translated by bilingual experts, were pretested with 50 Chinese internet users

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JIIII	Category	Characteristics	Ν	%	
	Gender	Male	221	41.2	
		Female	315	58.8	
	Age	Younger than 20 years old	13	2.4	
		20–29 years old	251	46.8	
		30–39 years old	216	40.3	
		40–49 years old	36	6.7	
	I	50 years old and more	20	3.7	
	Education	Highschool diploma or less	22	4.1	
		Associate degree	58	10.8	
		Bachelor's degree	370	69.0	
		Master's degree or higher	86	16.0	
	Occupation	Students	56	10.4	
	-	White collar	319	59.5	
		Officials	71	13.2	
		Self-employed	32	6.0	
		Professionals	28	5.2	
		Others	30	5.6	
Table 1.					
Demographic profile	Source: Authors' own	n creation			

and refined for clarity and accuracy. This step minimized response bias. In addition, Harman's single-factor test indicated that CMB was not a significant concern, with a single factor accounting for only 32.0% of the variance. Additionally, the skewness and kurtosis values were within the acceptable range as per Kline's (2005) criteria, thereby confirming data normality.

4.3 Second-order analysis of PCR

CFA was conducted to assess the second-order construct of PCR. The results demonstrated an acceptable level of model fit: $\chi^2 = 41.927$, df = 24, $\chi^2/df = 1.747$, NFI = 0.978, TLI = 0.986, CFI = 0.991 and RMSEA = 0.037, thus meeting Hair *et al.*'s (2010) recommended criteria. As shown in Table 2, all standardized factor loadings exceeded the criteria of 0.7 (Hair *et al.*, 2010), ranging from 0.688 to 0.808. The average variance extracted (AVE) of all factors exceeded the criteria of 0.5 (Hair *et al.*, 2010), ranging from 0.525 to 0.634. Composite reliability (CR) exceeded the criteria of 0.7 (Hair *et al.*, 2010), ranging from 0.768 to 0.839. Thus, convergent validity was confirmed.

4.4 Overall measurement model

CFA was conducted to assess the entire measurement model. The results of the CFA presented a satisfactory model fit: $\chi^2 = 274.307$, df = 217, $\chi^2/df = 1.264$, NFI = 0.956, TLI = 0.989, CFI = 0.990 and RMSEA = 0.022, thus meeting the criteria suggested by Hair *et al.* (2010). Table 3 demonstrates that all standardized factor loadings were greater than 0.7 (Hair *et al.*, 2010), within the range of 0.746 to 0.853. The AVE of all factors exceeded the criteria of 0.5 (Hair *et al.*, 2010), within the range of 0.588 to 0.687 (Table 3). CR exceeded the criteria of 0.7 (Hair *et al.*, 2010), within the range of 0.811 to 889 (Table 3). Thus, convergent validity was confirmed.

The square root of the AVE surpassed the interconstruct correlations, which further supported discriminant validity, as shown in Table 4.

Constructs and items	λ	Mean	Skew.	Kurt.	AVE	CR	α	Embracing the
Privacy risk (PR)					0.568	0.798	0.796	revolution
I am worried about the privacy of my personal data, if I use	0.762	3.180	0.286	-0.503				revolution
ChatGPT collects too much private information while gathering information related to tourism activities	0.746	3.260	0.188	0.001				
Personal information could be inappropriately used by the ChatGPT while gathering information related to tourism activities	0.752	3.230	0.289	-0.228				
Accuracy risk (AR)					0.634	0.839	0.838	
ChatGPT's text recognition is not accurate while gathering information related to tourism activities	0.780	2.960	0.649	-0.010				
ChatGPT is always giving me vague answers while gathering information related to tourism activities	0.808	3.010	0.609	0.182				
ChatGPT gives me fake information related to tourism activities	0.801	2.970	0.714	0.316				
Overreliance risk (ORR)					0.525	0.768	0.769	
I am worried about that I may be overreliant on ChatGPT and thus lose my ability to be original, if I use ChatGPT to gather information related to tourism activities	0.727	3.270	0.284	-0.150				
I am worried about that I may be over lean of the ChatGPT and thus lose my critical thinking skills, if I use ChatGPT to	0.688	3.240	0.289	-0.054				
gather information related to tourism activities I am worried about that I may be overreliant on ChatGPT and thus lose my decision-making abilities, if I use ChatGPT to gather information related to tourism activities	0.758	3.190	0.255	-0.390				
Notes: $\lambda =$ standardized factor loading. Mean = seven-poin	t Likert-	type scale	• AVE =	average v	ariance e	extracted	ŀCR =	Table 2.

composite reliability; $\alpha = \text{Cronbach's alpha; Skew} = \text{Skewness; Kurt} = \text{Kurtosis}$ Source: Authors' own creation

4.5 Structural equation modeling

The fit indices of the structural model were determined by VIF (<3.0), R^2 (>0.1) and standardized path coefficients (Hair et al., 2010). First, it was confirmed that there were no collinearity issues in this study, as all VIF values were below the critical threshold of 3. Second, the coefficient of determination R^2 indicated an explanatory power ranging from 0.204 to 0.416, indicating satisfactory results (Hair et al., 2010). In terms of SEM, overall indices showed a good fit: $\chi^2 = 332.037$, df = 220, $\chi^2/df = 1.509$, NFI = 0.947, TLI = 0.979, CFI = 0.981 and RMSEA = 0.031, thus satisfying the standards outlined by Hair et al. (2010). As presented in Figure 2, PCR was found to have a negative influence on ATT $(\beta_{\text{PCR}\to\text{ATT}} = -0.564, t = -8.695, p < 0.001), \text{SN} (\beta_{\text{PCR}\to\text{SN}} = -0.452, t = -7.751, p < 0.001)$ and PBC ($\beta_{PCR \to PBC} = -0.486$, t = -8.303, p < 0.001). Thus, H1, H2 and H3 were supported. Among the TPB constructs, all predictor variables were found to have positive effects on BI, specifically ATT ($\beta_{ATT\to BI} = 0.250, t = 4.303, p < 0.001$), SN ($\beta_{SN\to BI} = 0.208$, t = 4.225, p < 0.001) and PBC ($\beta_{PBC \rightarrow BI} = 0.128, t = 2.576, p < 0.01$). Hence, H4, H5 and H6 were supported. In addition, BI was negatively affected by PCR ($\beta_{PCR \rightarrow BI} = -0.274$, t =-3.542, p < 0.001). Hence, H7 was supported. Collectively, the structural model explained 31.9% of the variance in ATT, 20.4% of the variance in SN, 23.6% of the variance in PBC and 41.6% of the variance in BI.

JHTT	Constructs and items	λ	Mean	Skew.	Kurt.	AVE	CR	α
	Perceived risk (PCR): 2nd-order factor Privacy risk (PR): 1st-order factor Accuracy risk (AR): 1st-order factor Overreliance risk (ORR): 1st-order factor	0.808 0.791 0.754				0.615	0.827	0.876
	Attitude (ATT) I perceive that ChatGPT is a new and unique large language model to gather information related to tourism activities	0.747	4.950	-0.604	-0.171	0.588	0.811	0.862
	ChatGPT provides convenience and they are very trendy to gather information related to tourism activities	0.806	4.890	-0.545	-0.307			
	Using ChatGPT is a thrilling and nice experience to gather information related to tourism activities	0.746	5.010	-0.707	-0.082			
	Subjective norm (SN) People who influence my behavior think that I should use ChatGPT to gather information related to tourism activities	0.824	4.980	-0.519	-0.264	0.687	0.868	0.809
	I would use ChatGPT because a large proportion of my friends use ChatGPT to gather information related to tourism activities	0.826	4.980	-0.605	-0.029			
	People around me think that I should use ChatGPT to gather information related to tourism activities	0.836	4.850	-0.558	-0.039			
	Perceived behavioral control (PBC) It will be very easy for me to use ChatGPT to gather information related to tourism activities	0.818	5.000	-0.547	-0.074	0.668	0.889	0.868
	I feel in complete control when using ChatGPT to gather information related to tourism activities	0.774	4.930	-0.532	-0.217			
	I could independently use all functionalities of ChatGPT to gather information related to tourism activities	0.823	4.900	-0.513	-0.238			
	I could clearly distinguish the valid and invalid information provided by ChatGPT to gather information related to tourism activities	0.853	4.990	-0.495	-0.134			
	Behavioral intention (BI) If I need information, I will choose ChatGPT for the inquiry of tourism activities	0.822	5.190	-0.792	0.550	0.640	0.877	0.889
	If someone around me requires information on tourism activities, I will recommend using ChatGPT	0.832	5.170	-0.791	0.479			
	I want to tell other people positive things about ChatGPT and the use of ChatGPT to gather information related to tourism activities	0.767	5.130	-0.792	0.500			
Table 3.Results of CFA for	I would like to try the functionalities provided by ChatGPT to gather information related to tourism activities	0.778	5.170	-0.767	0.534			
overall measurement model	Notes: λ = standardized factor loading; AVE = average va Source: Authors' own creation	ariance ex	tracted; Cl	R = compos	ite reliabili	ty; $\alpha = Cr$	onbach's	alpha

5. Conclusion and implications

This study explored tourists' use of ChatGPT for travel information by focusing on the attitudes and perceived risks that impact usage intentions. The findings confirm tourists' concerns about ChatGPT, particularly regarding privacy risks, as highlighted by OpenAI's data breach (OpenAI, 2023a) and accuracy issues, where responses may be coherent but occasionally erroneous (Jo, 2023). However, the overreliance risk is less pronounced.

Despite its issues, ChatGPT represents a significant advancement in information retrieval for the tourism industry. Its ability to filter vast information quickly and accurately negates the need for tourists to navigate complex data sources. While acknowledging the potential for inaccurate information, ChatGPT's user-friendly interface and rapid response system offer a novel and efficient method for accessing travel information, thus contributing positively to the tourism sector's sustainable development.

5.1 Theoretical implications

This research provides numerous significant theoretical repercussions for the current literature. First, no studies were found, assessing the impact of perceived risks of ChatGPT usage, in the context of retrieval of travel information. To address this research gap, a conceptual model with the backdrop of TPB, was developed to test different dimensions of perceived risks with other constructs. Previous research has remained at the hypothetical level, speculating about the impact of ChatGPT on the tourism industry. This study highlights the priority of privacy, accuracy and overreliance risks associated with ChatGPT in enhancing tourists' acceptance, which is the decisive determinant of BI. Furthermore, this study provides evidence based on the

Constructs	ATT	SN	PBC	BI	PCR
ATT	0.767				
SN	0.431***	0.829			
PBC	0.408***	0.366***	0.817		
BI	0.533***	0.467***	0.421***	0.800	
PCR	-0.492^{***}	-0.370^{***}	-0.416^{***}	-0.521***	0.784

Notes: The italic diagonal values are the square root of AVE; values under the diagonal values are correlation coefficients; ***p < 0.001**Source:** Authors' own creation

Table 4. Discriminant validity



Figure 2. Estimation of the structural model

JHTT

outcome of this research and offers theoretical foundations for the sustainable development of generative AI in the tourism domain.

Second, the extended TPB model used in this study integrates volitional (ATT) and nonvolitional elements (PBC) into the perceived risks of tourists using ChatGPT for travel information. The proposed model draws inspiration from existing literature, addressing research gaps and empirical analysis needs on AI in the tourism sector, particularly in the context of ChatGPT's acceptance. Studies by Ali et al. (2023a), Carvalho and Ivanov (2023) and Mich and Garigliano (2023) specifically proposed to further conduct research on the perceived risks associated with ChatGPT. The results show that PCR associated with ChatGPT has a significantly negative impact on ATT, SN and PBC, which aligns with the hypotheses of previous research (Lee, 2009; Liao et al., 2010; Xie et al., 2017). These studies validated the assumptions of PCR with the TPB constructs; however, they focused on internet banking, pirated software and e-government research. This study tested the relationships of PCR with the TPB constructs related to AI in the tourism sector. PCR also has a significantly negative impact on the BI of ChatGPT. This finding aligns with previous research (Kim *et al.*, 2020), which highlights the importance of PCR in tourists' BI (Dogru et al., 2023b). In line with this view, García de Blanes Sebastián et al. (2022) emphasized that the PCR of AI directly influences users' BI. PBC has a relatively weaker influence on BI due to tourists' need for accuracy verification through other platforms, thus adding complexity to the usage process (Zorlu et al., 2022). These findings support the TPB framework (Ajzen, 1991) and previous literature (Girish et al., 2022; Han et al., 2010).

Finally, to investigate how PCR affects tourists' perception of the three risks associated with using ChatGPT for travel information search, this study conducted a second-order analysis. This analysis ensured a clear and understandable description of PCR (Gustafsson and Balke, 1993). The results demonstrated a good fit of the second-order factor model for the nine items of the first-order factors (PR, AR and ORR), and the convergent validity of the findings was satisfactory (Hair *et al.*, 2010). Therefore, the fundamental concept of PCR in the context of ChatGPT-based travel information search can be effectively expressed by three first-order variables (PR, AR and ORR). This study contributes to the literature by providing a theoretical reference for future research.

5.2 Practical implications

This study underscores the strategic importance of enhancing ChatGPT's role in tourism by emphasizing privacy, accuracy, user engagement and social acceptance. Addressing privacy concerns is paramount. Implementing data encryption, secure storage, user consent practices, staff training, confidentiality agreements and third-party data reviews are essential for minimizing privacy risks and boosting user trust. Furthermore, the accuracy of ChatGPT's travel recommendations can be improved by diversifying its training data across various cultures and domains, regularly updating its knowledge base and incorporating real-time tourism information. Additionally, the introduction of humanassisted verification can ensure the quality of highly personalized information. To mitigate overreliance on ChatGPT, users should be encouraged to engage critically with its recommendations and use a mix of sources, such as tourism websites, travel books and social media. Continuously refining ChatGPT through user feedback ensures that it aligns closely with user needs. Enhancing social acceptance involves promoting the sharing of ChatGPT-provided information on social media, securing endorsements from experts and facilitating user education and support. Simplifying the interface will further empower users, thereby increasing their confidence and proficiency in using ChatGPT for travel planning.

Second, despite concerns and uncertainties, the introduction of ChatGPT holds promising prospects for the tourism industry. By offering personalized recommendations and enhancing operational efficiency, ChatGPT has the potential to revolutionize travel experiences. Its integration can establish an online travel agency that assists with trip planning; provides 24/7 support; offers customized suggestions for activities, dining and accommodations based on individual preferences. Furthermore, ChatGPT's multilingual capabilities facilitate global expansion, catering to diverse travelers and delivering exceptional travel knowledge and experiences. Additionally, the cost-effectiveness of ChatGPT is a significant advantage, as it can handle multiple inquiries simultaneously. Thus, it reduces the need for additional customer service personnel and lowers operational costs for tourism businesses.

Finally, recognizing the potential of ChatGPT in enhancing customer service and operational efficiency is crucial for tourism enterprises. As their interest in adopting ChatGPT grows, increased investments and resources will be dedicated to developing and implementing ChatGPT solutions. This enhancement may involve creating customized ChatGPT solutions and actively engaging in training and development programs to empower employees in effectively using ChatGPT's capabilities. Such initiatives can contribute to improved customer service and overall operations within the tourism industry.

5.3 Limitations and future research directions

This study's limitations include its focus on Chinese respondents, which has restricted the generalizability of findings. Hence, future research should incorporate a more diverse international sample for broader applicability. Additionally, the study's reliance on a single analytical approach suggests the potential benefit of integrating deep learning with big data analysis in future studies to enrich findings on ChatGPT's use in tourism. While this research concentrated on the risks of ChatGPT, extending the scope to its benefits can provide a more comprehensive understanding. Moreover, the study's theoretical basis on TPB can be expanded by integrating or comparing it with other models, such as the technology acceptance model and the unified theory of acceptance and use of technology, which have shown promise in AI research (e.g. Ali *et al.*, 2023b; Ho *et al.*, 2021). Furthermore, as AI technology advances, perceptions toward the risk and reliability in AI chatbots such as ChatGPT are likely to evolve, thus potentially influencing user adoption positively. Finally, future studies can broaden the perspective beyond tourists to include the impacts of ChatGPT on tourism businesses, employees and local communities.

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