Embracing the ChatGPT revolution: unlocking new horizons for tourism

Ji Shi
College of Hotel and Tourism Management, Kyung Hee University, Seoul, Republic of Korea

Minwoo Lee
Conrad N Hilton College of Global Hospitality Leadership, University of Houston, Houston, Texas, USA

V.G. Girish
Department of Business Administration, The Catholic University of Korea, Bucheon-si, Republic of Korea, and

Guangyu Xiao and Choong-Ki Lee
College of Hotel and Tourism Management, Kyung Hee University, Seoul, Republic of Korea

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.
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)

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 for 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 interface for personalized vacation planning and GuideGeek’s use of 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.
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;
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.
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 0.889 (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.
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 multicollinearity 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 ($\beta_{PCR\rightarrow ATT} = -0.564$, $t = -8.695$, $p < 0.001$), SN ($\beta_{PCR\rightarrow SN} = -0.452$, $t = -7.751$, $p < 0.001$) and PBC ($\beta_{PCR\rightarrow PBC} = -0.486$, $t = -8.303$, $p < 0.001$). Thus, $H1$, $H2$ and $H3$ were supported. Among the TPB constructs, all predictor variables were found to have positive effects on BI, specifically ATT ($\beta_{ATT\rightarrow BI} = 0.250$, $t = 4.303$, $p < 0.001$), SN ($\beta_{SN\rightarrow BI} = 0.208$, $t = 4.225$, $p < 0.001$) 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.

<table>
<thead>
<tr>
<th>Constructs and items</th>
<th>$\lambda$</th>
<th>Mean</th>
<th>Skew.</th>
<th>Kurt.</th>
<th>AVE</th>
<th>CR</th>
<th>$\alpha$</th>
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</thead>
<tbody>
<tr>
<td>Privacy risk (PR)</td>
<td></td>
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<tr>
<td>I am worried about the privacy of my personal data, if I use ChatGPT to gather information related to tourism activities</td>
<td>0.762</td>
<td>3.180</td>
<td>0.286</td>
<td>-0.503</td>
<td>0.568</td>
<td>0.798</td>
<td>0.796</td>
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<tr>
<td>ChatGPT collects too much private information while gathering information related to tourism activities</td>
<td>0.746</td>
<td>3.260</td>
<td>0.188</td>
<td>0.001</td>
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<tr>
<td>Personal information could be inappropriately used by the ChatGPT while gathering information related to tourism activities</td>
<td>0.752</td>
<td>3.230</td>
<td>0.289</td>
<td>-0.228</td>
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<td>Accuracy risk (AR)</td>
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<td>ChatGPT’s text recognition is not accurate while gathering information related to tourism activities</td>
<td>0.780</td>
<td>2.960</td>
<td>0.649</td>
<td>-0.010</td>
<td>0.634</td>
<td>0.839</td>
<td>0.838</td>
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<tr>
<td>ChatGPT is always giving me vague answers while gathering information related to tourism activities</td>
<td>0.808</td>
<td>3.010</td>
<td>0.609</td>
<td>0.182</td>
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<tr>
<td>ChatGPT gives me fake information related to tourism activities</td>
<td>0.801</td>
<td>2.970</td>
<td>0.714</td>
<td>0.316</td>
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<td>Overreliance risk (ORR)</td>
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<td>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</td>
<td>0.727</td>
<td>3.270</td>
<td>0.284</td>
<td>-0.150</td>
<td>0.525</td>
<td>0.768</td>
<td>0.769</td>
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<td>I am worried about that I may be overreliant on ChatGPT and thus lose my critical thinking skills, if I use ChatGPT to gather information related to tourism activities</td>
<td>0.688</td>
<td>3.240</td>
<td>0.289</td>
<td>-0.054</td>
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<tr>
<td>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</td>
<td>0.758</td>
<td>3.190</td>
<td>0.255</td>
<td>-0.390</td>
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Notes: $\lambda$ = standardized factor loading; Mean = seven-point Likert-type scale; AVE = average variance extracted; CR = composite reliability; $\alpha$ = Cronbach’s alpha; Skew = Skewness; Kurt = Kurtosis

Source: Authors’ own creation

Table 2. The results of CFA for PCR
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.

<table>
<thead>
<tr>
<th>Constructs and items</th>
<th>λ</th>
<th>Mean</th>
<th>Skew.</th>
<th>Kurt.</th>
<th>AVE</th>
<th>CR</th>
<th>α</th>
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<tbody>
<tr>
<td>Perceived risk (PCR): 2nd-order factor</td>
<td>0.615</td>
<td>0.827</td>
<td>0.876</td>
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<td>Privacy risk (PR): 1st-order factor</td>
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<td>Accuracy risk (AR): 1st-order factor</td>
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<td>Overreliance risk (ORR): 1st-order factor</td>
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<tr>
<td>Attitude (ATT)</td>
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<tr>
<td>I perceive that ChatGPT is a new and unique large language model to gather information related to tourism activities</td>
<td>0.747</td>
<td>4.950</td>
<td>−0.604</td>
<td>−0.171</td>
<td>0.588</td>
<td>0.811</td>
<td>0.862</td>
</tr>
<tr>
<td>ChatGPT provides convenience and they are very trendy to gather information related to tourism activities</td>
<td>0.806</td>
<td>4.890</td>
<td>−0.545</td>
<td>−0.307</td>
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<tr>
<td>Using ChatGPT is a thrilling and nice experience to gather information related to tourism activities</td>
<td>0.746</td>
<td>5.010</td>
<td>−0.707</td>
<td>−0.082</td>
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<tr>
<td>Subjective norm (SN)</td>
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</tr>
<tr>
<td>People who influence my behavior think that I should use ChatGPT to gather information related to tourism activities</td>
<td>0.824</td>
<td>4.980</td>
<td>−0.519</td>
<td>−0.264</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would use ChatGPT because a large proportion of my friends use ChatGPT to gather information related to tourism activities</td>
<td>0.826</td>
<td>4.980</td>
<td>−0.605</td>
<td>−0.029</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People around me think that I should use ChatGPT to gather information related to tourism activities</td>
<td>0.836</td>
<td>4.850</td>
<td>−0.558</td>
<td>−0.039</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived behavioral control (PBC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It will be very easy for me to use ChatGPT to gather information related to tourism activities</td>
<td>0.818</td>
<td>5.000</td>
<td>−0.547</td>
<td>−0.074</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel in complete control when using ChatGPT to gather information related to tourism activities</td>
<td>0.774</td>
<td>4.930</td>
<td>−0.532</td>
<td>−0.217</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I could independently use all functionalities of ChatGPT to gather information related to tourism activities</td>
<td>0.823</td>
<td>4.900</td>
<td>−0.513</td>
<td>−0.238</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I could clearly distinguish the valid and invalid information provided by ChatGPT to gather information related to tourism activities</td>
<td>0.853</td>
<td>4.990</td>
<td>−0.495</td>
<td>−0.134</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioral intention (BI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If I need information, I will choose ChatGPT for the inquiry of tourism activities</td>
<td>0.822</td>
<td>5.190</td>
<td>−0.792</td>
<td>0.550</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If someone around me requires information on tourism activities, I will recommend using ChatGPT</td>
<td>0.832</td>
<td>5.170</td>
<td>−0.791</td>
<td>0.479</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I want to tell other people positive things about ChatGPT and the use of ChatGPT to gather information related to tourism activities</td>
<td>0.767</td>
<td>5.130</td>
<td>−0.792</td>
<td>0.500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would like to try the functionalities provided by ChatGPT to gather information related to tourism activities</td>
<td>0.778</td>
<td>5.170</td>
<td>−0.767</td>
<td>0.534</td>
<td></td>
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</tr>
</tbody>
</table>

Table 3: Results of CFA for overall measurement model

Notes: λ = standardized factor loading; AVE = average variance extracted; CR = composite reliability; α = Cronbach’s alpha
Source: Authors’ own creation
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

<table>
<thead>
<tr>
<th>Constructs</th>
<th>ATT</th>
<th>SN</th>
<th>PBC</th>
<th>BI</th>
<th>PCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATT</td>
<td>0.767</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>0.431***</td>
<td>0.829</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PBC</td>
<td>0.408***</td>
<td>0.366***</td>
<td>0.817</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BI</td>
<td>0.533***</td>
<td>0.467***</td>
<td>0.421***</td>
<td>0.800</td>
<td></td>
</tr>
<tr>
<td>PCR</td>
<td>-0.492***</td>
<td>-0.570***</td>
<td>-0.416***</td>
<td>-0.521***</td>
<td>0.784</td>
</tr>
</tbody>
</table>

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](chart.png)

Notes: *p < 0.05; **p < 0.01; ***p < 0.001

Source: Authors own creation
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, Garcia de Blanes Sebastian 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 human-
assisted 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.

References


Corresponding author
Choong-Ki Lee can be contacted at: cklee@khu.ac.kr

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