JOURNAL OF THE FACULTY OF TOURISM AND HOTELS
UNIVERSITY OF SADAT CITY
Journal homepage:
https://mfth.journals.ekb.eg/

How is Tourist Loyalty Affected by Chatbots Symbolic Recovery? A Mediation Model

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Printed ISSN: 2537-0952
Online ISSN: 3062-5262
DOI: 10.21608/MFTH.2025.419174

ABSTRACT
AI-powered chatbots are becoming more widespread in the tourist industry for handling customer service difficulties; nevertheless, little is known about how they recover from these situations. Customer loyalty is anticipated to be positively impacted by the widespread use of chatbots. Using chatbots' performance and interaction customization as a lens, this research aims to examine how symbolic recovery affects tourists' loyalty. Additionally, it explores how chatbots' symbolic recovery affects tourists' ability to reconcile and remain loyal. The research used structural equation modeling to analyze data collected from 500 tourists through an online questionnaire distributed From November till January 2025. Based on the results, it appears that chatbots may help tourists to settle and continue to be loyal by increasing customer loyalty via symbolic recuperation. Another way in which chatbots' symbolic recovery affects tourists' loyalty is via tourist satisfaction. The results give promising information that tourist organizations may use to improve chatbots' symbolic recovery. Businesses catering to tourists will be motivated to use chatbots for service recovery if they are efficient in helping with symbolic rehabilitation and ensuring customer loyalty.

KEYWORDS
Loyalty, chatbots, symbolic recovery - tourist satisfaction.

كيف يتأثر ولاء السائح باستخدام برامج استعادة الخدمة الرمزية لبرامج المحادثة الذكية؟ نموذج وساطة

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الترقيم الدولى الموحد للطباعة:
2537-0952
الترقيم الدولى الموحد الإلكترونى:
3062-5262
DOI:
10.21608/MFTH.2025.419174

الملخص

تُعد برامج المحادثة الذكية المعتمدة على الذكاء الاصطناعي أداة شائعة لمعالجة القضايا التي يواجهها السائحين في قطاع السياحة، إلا أن هناك نقصًا في الفهم العميق لاستراتيجيات التعافي التي تعتمدها هذه البرامج، رغم تأثيرها الكبير على ولاء السائحين. من المتوقع أن يؤدي الاستخدام المكثف لهذا النوع من البرامج إلى تأثير إيجابي على تفاعلات السائحين وردود أفعالهم تهدف هذه الدراسة إلى استكشاف أثر استراتيجيات استعادة الخدمة الرمزية التي تقدمها برامج المحادثة الذكية ومدى تأثيرها على ولاء السائحين، مع التركيز على دور أداء البرامج وقدرتها على تخصيص التفاعل مع العملاء. كما تسلط الدراسة الضوء على العلاقة بين هذه الاستراتيجيات وتحقيق المصالحة والمسامحة عند حدوث إخفاق في تقديم الخدمات السياحية، مما يعزز الولاء المستمر للسائحين. لتحليل النتائج، تم استخدام نمذجة المعادلة الهيكلية استنادًا إلى بيانات جُمعت من 500 سائحاً عن طريق استمارة استقصاء إلكترونية تم توزيعها من شهر نوفمبر حتي يناير 2025.أظهرت النتائج أن الاستراتيجيات الرمزية لاستعادة الخدمة التي توفرها برامج المحادثة الذكية تسهم بشكل ملحوظ في زيادة ولاء السائحين وتعزيز المصالحة السياحية .كما أكدت الدراسة وجود دور وسيط لرضاء السائح في العلاقة بين التعافي الرمزي وبرامج المحادثة الذكية وتأثيره على ولاء السائحين. توفر هذه النتائج رؤى مهمة يمكن أن تدعم المنظمات السياحية في تحسين استراتيجيات استعادة الخدمة لدى برامج المحادثة الذكية، سيتم تحفيز الشركات التي تقدم خدماتها للسائحين على استخدام برامج المحادثة الذكية لاستعادة الخدمة في حالة كونها فعالة في المساعدة في إعادة التأهيل الرمزي وضمان ولاء السائحين.

الكلمات الدالة

الولاء، برامج المحادثة الذكية ، استراتيجية استعادة الخدمة الرمزية، رضاء السائحين.

Introduction

According to Maklan et al. (2017), customer loyalty has a big role in how much money a company makes. Customers form strong impressions of businesses based on their experiences with their Artificial Intelligence (AI) chatbots, which are often their first point of contact with such businesses. An example of AI is the chatbot, which enables machines to hold real-time conversations with people using language that people understand (Chaves and Gerosa, 2021). Chatbots may answer user inquiries using many channels of communication, such as voice and text, as stated by Xing et al. (2022). About 25% of the hotel and tourism sector is reportedly adopting chatbots to handle common customer care questions, according to a recent study (Zhang et al., 2023). Now, chatbots can handle client complaints after service issues have happened, in addition to assisting with boring tasks like meal ordering (Hu et al., 2021; Leung and Wen, 2020). Many scholars, such as Zhu et al. (2023), have distinguished between symbolic and utilitarian recovery techniques. According to Smith et al. (1999), symbolic healing offers psychological resources like apologies, empathy, promises, or guarantees, whereas utilitarian healing offers real resources like compensation or discounts. The inherent modularity of AI services and the diverse characteristics of service sector customers make it difficult to accurately estimate consumer losses caused by AI, according to Huang and Rust (2018). As a result, recovery methods for chatbot services cannot be used to implement practical recovery strategies (Lv et al., 2022). In addition, it is also uncommon for service providers to try to appease unhappy clients by making symbolic gestures, including apologizing (You et al., 2020).

There has been a lot of study on chatbots in the tourism and hospitality sectors, but much of it has focused on whether or not consumers are eager to use them and how successful they are (Lei et al., 2021; Pillai and Sivathanu, 2020; Leung and Wen, 2020). There is limited literature on the causes of customer loyalty in the context of AI services, even though it is crucial for businesses to have loyal customers. The symbolic rehabilitation service's impact on client loyalty is unclear. Therefore, the study examines the impact of AI chatbot symbolic recovery on tourist loyalty and whether it is stimulated through the mediating role of perceived value, trust, and satisfaction or not. Hence, we proposed the research question:

How is tourist loyalty affected by chatbots symbolic recovery?

As a result of persistent issues with human-chatbot interaction, service providers are looking at ways to use chatbots to efficiently restore services. Xu and Liu (2022) pointed out that the difficulties associated with AI service outages and subsequent recoveries in the travel industry have received little academic attention. More research into chatbot service failures and recovery techniques is needed for this. Regarding their empathetic responses (Fan et al., 2023) and symbolic recovery performance (Zhang et al., 2023), there has been limited research into chatbots as recovery agents for resolving customer complaints. The aim of this study is to determine how symbolic recovery (ChSR) in chatbots can enhance tourist loyalty (TL). The study gives a novel contribution to AI chatbot literature because limited previous research in Egypt has examined the correlations between AI chatbot symbolic recovery, tourist loyalty, satisfaction, perceived value, and trust in the tourism context.

Literature review

The stimulus-organization-response (S.O.R.) model is the prevailing paradigm for explaining the impact of environmental psychology on individual behavioral responses. The central idea of S.O.R. theory is that various stimuli (S) impact an individual's emotions or internal processes (O), causing behavioral responses (Song et al., 2019). The proposed theory of S.O.R. is appropriate for inquiry in this paper. In reaction to the online store's service breakdown, the chatbot's symbolic recuperation aims to engage customers, generate empathy, and develop contentment, increasing tourist loyalty.

Chatbots in tourism

A chatbot powered by AI is a piece of software that can hold natural-sounding conversations with people in real time (Chaves and Gerosa, 2021). As an interactive piece of software, a chatbot takes user-supplied text and produces text in the same natural language. Consequently, a chatbot may converse with humans using either text or voice (Lei et al., 2021). For this to work, the chatbot needs natural Language Processing (NLP), which includes Natural Language Generation (NLG) and Natural Language Understanding (NLU) (Adamopoulou and Moussiades, 2020). Natural language processing is essential for this. One of the most basic algorithms utilized by chatbots is natural language processing. The test regulates how well a chatbot can understand human speech and, by extension, how accurate its responses will be (Vijayaraghavan et al., 2020). The goal of NLU a subfield of NLP (Adamopoulou and Moussiades, 2020), is to abstractly represent context extracted and meaning from natural language. According to Adamopoulou and Moussiades (2020), NLG enables computers to provide responses that look like human conversation. The bot is able to comprehend syntax, intent, and emotion in written text thanks to natural language processing. In most cases, this is due to the many capabilities provided by natural language processing, such as the ability to analyze sentiment polarity, vectorize words, and summarize texts (Vijayaraghavan et al., 2020). Chatbots may show emotions and empathy, according to Fan et al. (2023), because of natural language processing techniques and other technologies that improve AI. Using AI chatbots for customer assistance might be a growing trend in the tourism and hospitality industries, since they provide empathetic responses and help reduce service failures (Zaki & Al-Romeedy, 2024).

It would seem that chatbots have revolutionized the ways in which hotels, tourism businesses, and their customers communicate (Pillai and Sivathanu, 2020). One example of the numerous possible shapes that chatbots may take is the integration of messaging apps with social media platforms, such as Facebook chatbots, and bot systems like Alexa. Lin and Hsu (2012). Chatbots may take the place of human front-line workers and assist customers with decision-making by continually answering their queries autonomously (Li and Zhang, 2023). A number of industries are beginning to use chatbots in place of human workers, including product delivery and customer support. According to Song et al. (2022), these bots are very skilled at processing complicated data quickly and consistently, and they can operate continuously. Possible solutions include addressing issues connected to human

workers' lack of soft skills or weariness, which might result in less-than-ideal decision-making (Song et al., 2022).

Businesses in the tourist and hospitality industries have challenges when trying to use chatbot technology. Tourist companies are understandably wary about chatbots due to the potential security risks associated with client data. Ensuring data synchronization and compatibility with present systems and infrastructure is both vital and technically demanding. Natural language processing chatbots may fail miserably when faced with intricate vocabulary or subtle contexts. Farahat (2023) adds that chatbots can't display advanced emotions, which might make them annoying to converse with.

Chatbots' symbolic recovery strategies

According to Song et al. (2022), service recovery is when a supplier of a service takes steps to change how a client perceives their bad experience. Symbolic recovery and economic or utilitarian recovery are the two main categories of recovery techniques (Smith et al., 1999; Lv et al., 2022; Zhu et al., 2023). Symbolic recovery provides emotional resources like a promise, explanation, or assurance; empathy; utilitarian recovery provides material resources such as discounts or money (Smith et al., 1999; Lv et al., 2022). Huang and Rust (2018) refers to the diverse nature of service sector customers and the intrinsic modularity of AI services that make it impossible to correctly estimate consumer losses. Utilitarian recovery methods cannot be achieved utilizing chatbot service recovery, as is shown from Lv et al. (2022). Resolving customer complaints should begin with symbolic healing, according to You et al. (2020). Attribution to three items is possible here. Customer value and respect may be revived via symbolic recovery (Zhang et al., 2023). Anger is one of the unpleasant emotions evoked by consumer complaints (Chen et al., 2020). It is possible that symbolic healing might help them feel better emotionally and mentally (Smith et al., 1999). Last but not least, symbolic recovery shows corporate sensitivity while cutting recovery costs significantly (Roschk and Kaiser, 2013).

Tourist Loyalty

The loyalty of tourists has been essential for many years. Tourist loyalty denotes the degree to which a customer remains committed to a brand in terms of both attitudes and actions. Regardless of the availability of alternatives from competing providers. For several firms, consumers who consistently engage in repeat purchases have significant value. The expense of acquiring a new client significantly exceeds the expense of keeping an existing one. Moreover, a repeat consumer guarantees an elevated average customer value. This establishes the significance of tourist loyalty (McMullan & Gilmore, 2008).

Pratminingsih et al., (2013) & Van et al., (2012), identify three primary factors influencing tourist loyalty: customer trust (Bryant & Colledge, 2002) customer satisfaction (Herrmann et al., 2007), and commitment (Kotler & Armstrong, 2010). Figure 1 depicts the correlation among tourist loyalty, satisfaction, trust, and commitment. According to Figure 1, customer satisfaction pertains to consumers' contentment with a company's goods, services, and competencies in the previous (Herrmann et al., 2007). Trust denotes a consumer's future confidence in a brand (Bryant & Colledge, 2002), tourist loyalty refers to a customer's involvement or

ongoing duty to repeatedly patronize the same firm and contribute to the relationship.

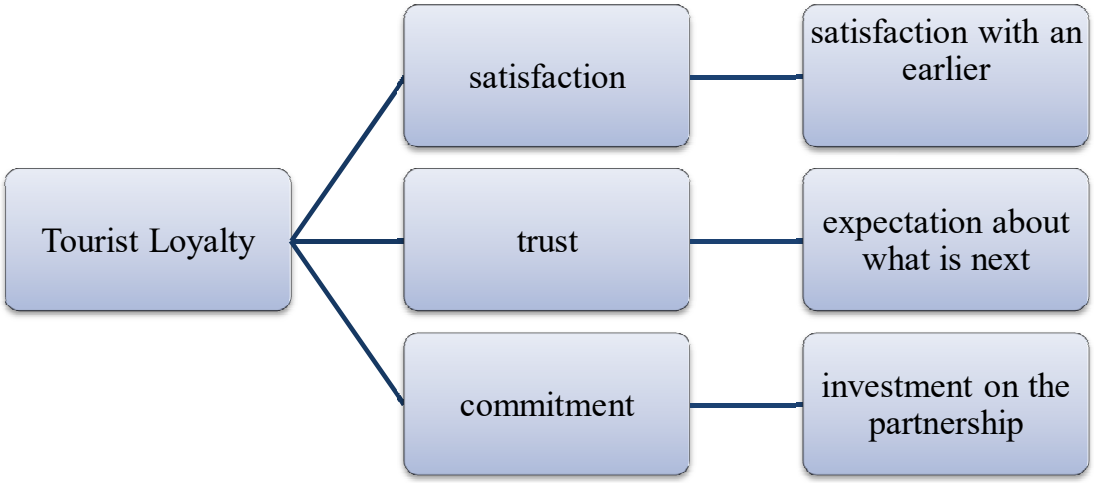

Figure 1. Drivers of Tourist loyalty

Source: Leck et al (1992)

The three primary factors of tourist loyalty affect both behavioral loyalty and attitudinal loyalty (Leck et al., 1992).

Customer loyalty in the tourism sector is important because it is generally less expensive to keep existing customers than to attract new ones (Herrmann et al., 2007). Loyal customers are expected to show an increased likelihood of making additional purchases from the same company (Rust & Zahorik, 1993). Additionally, customers who are loyal are likely to spread positive word of mouth, which relates to attitude loyalty. Research by Hallowell (1996) and Lake (1995) demonstrated a strong link between tourist satisfaction and loyalty, which in turn leads to greater profitability.

Chatbots and customer experience

It is essential to engage the consumer at the appropriate moment and address them individually (Carvajal, 2011). A viable method for doing this is via engaging with the firm via a chatbot, hence enhancing the customer experience (Mende et al., 2019; Sidaoui et al., 2020). Figure 2 illustrates the correlation between chatbot quality and customer experience. A company's chatbot aiming to provide an optimal customer experience in information systems adheres to service quality and information quality standards (Delone & McLean, 1992).

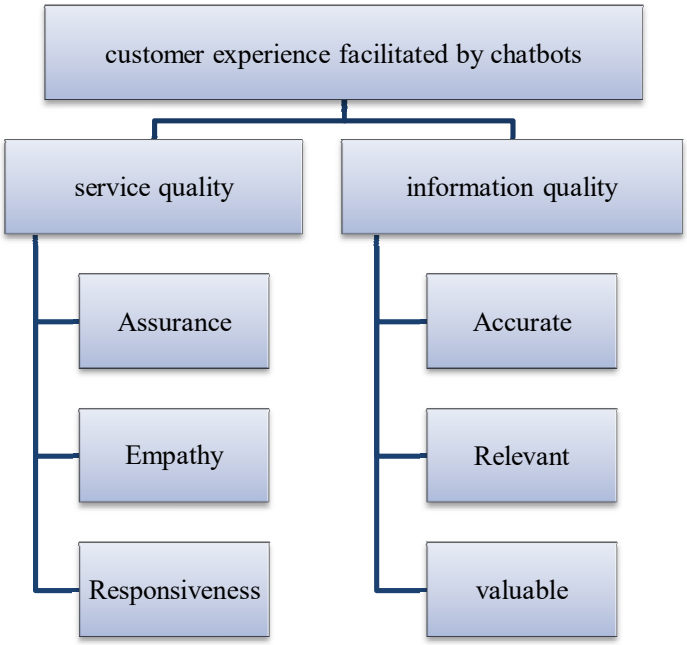

Figure 2: Aspects of customer experience facilitated by chatbots
Source: created by authors

The quality of service is crucial for businesses as it affects how customers perceive their experiences. A superior customer experience can lead to greater satisfaction, trust, and commitment, ultimately enhancing loyalty and purchase intentions. The core elements of service quality include assurance, responsiveness, and empathy (Trivedi, 2019). Assurance refers to the professional skills in problem-solving and communication used to assist clients with their issues. Responsiveness involves the timely provision of services to the customer, while empathy means understanding the needs of consumers (Trivedi, 2019).

Chatbots provide real-time responses to consumer inquiries and concerns, hence reducing the likelihood of firms neglecting client engagement. Chung et al. (2020) asserted asserted that chatbots provide an additional layer of assistance and complaint resolution for service quality by guaranteeing that, thanks to digitalization, customized service is accessible to fulfill client wants at any time and location. Nonetheless, digitization has raised consumer worries around the disclosure of personal information. Simultaneously, such worries diminish in significance when confronted with a reward or proposition (Kokolakis, 2017). A Gartner (2018) indicated that chatbots can manage client progression more efficiently than people by using effective decision trees. Factors such as efficient (virtual) staff, prompt service, charisma, accurate information, and service quality influence the customer experience (Hokanson, 1995). Exceeding client prospects may transform customer contentment into customer loyalty (Hallowell, 1996).

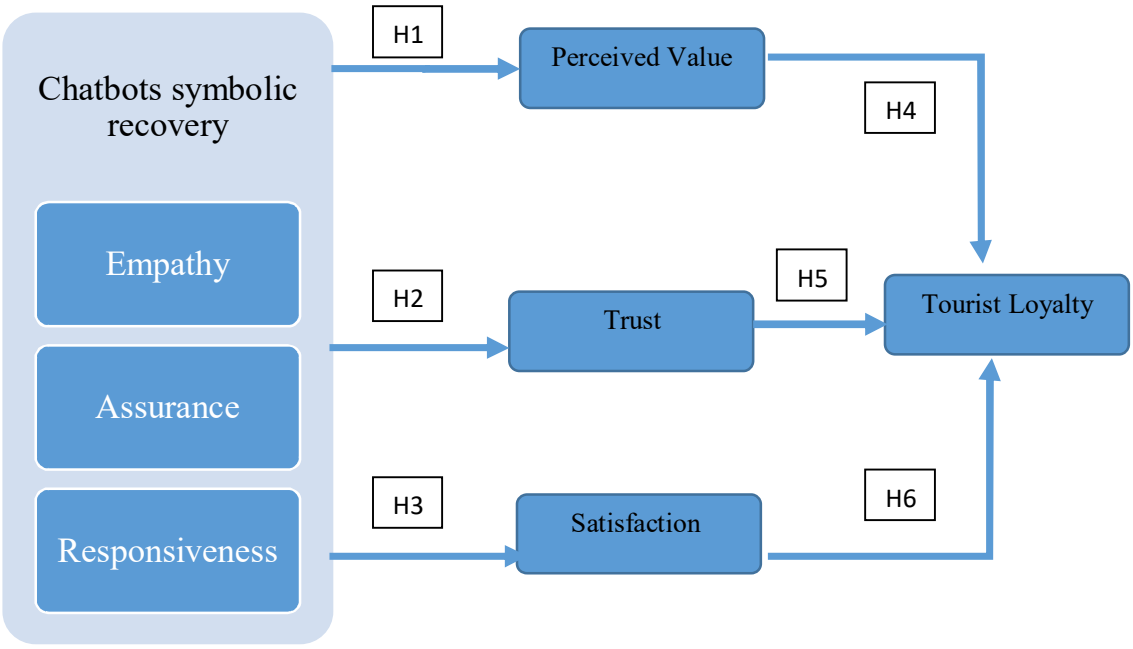

Figure 3 suggested theoretical structure.
Source: created by authors

AI chatbot symbolic recovery and perceived value

The phrase "perceived value" denotes the extent to which a buyer values a product or service based on its perceived advantages and expenses (Zeithaml, 1988). A person's sense of value is based on how much they value the advantages they get relative to the sacrifices they believe they have made (Lin et al., 2012). Products and services are typically seen to have benefits due to their qualities, practicality, and qualities (Lindic and Marques da Silva, 2011). Any sacrifice or outlay, monetary or otherwise, is considered a cost. According to Lindic and Marques da Silva (2011), customers' perceptions of the time, effort, and risk involved with a product are non-monetary sacrifices. A consumer's perceived value is determined by weighing the benefits against the costs. The ability of the service provider to fulfill client needs determines how valuable the service is considered by consumers (Zehir and Narcıkara, 2016). Customers' valuation of a service is affected by its quality, as it reflects their overall subjective evaluation of the service (Parasuraman et al., 1988). New empirical evidence from studies like Kettinger et al. (2009) and Thaichon et al. (2014) demonstrates that higher service quality corresponds positively with perceived customer value. These three aspects of AI chatbot service quality might increase perceived advantages or decrease expenses, according to this study's paradigm. Customers save time and effort by not having to worry about where to get a service since it is always available and always present. Effective communication is facilitated by replies that are accurate. An AI chatbot can understand what customers want and provide them with accurate answers. Service failure may be mitigated when human service alternatives are available in the event that an AI chatbot does not appropriately serve customers. With the help of a personalized recommendation, customers may save money on their search while still getting the ingredients they want for their

meals. Emotional relevance is provided to consumers via human-like empathy. So, here's the hypothesis that proposes:
H1. AI chatbot symbolic recovery has a positive impact on user-perceived value of chatbots.

AI chatbot symbolic recovery and trust

When engaging with a business, customers develop trust in two primary ways: through cognitive and emotional means. Cognitive trust refers to the extent to which an individual considers an entity to be trustworthy after assessing it logically (Chai et al., 2015). The judgment is based on evidence of the service provider's knowledge and performance, including their reliability, competence, and trustworthiness (Johnson and Grayson, 2005). In the realm of AI chatbot services, customers perceive the trustee's expertise and understanding through four key factors: the accuracy of the response. The correctness of an answer relies on how effectively the AI can comprehend or interpret the question. Chatbots that utilize AI can only meet customers' requirements and deliver satisfactory replies if they fully understand those needs (Li et al., 2021). Online services often struggle to recognize requests due to a lack of responsive accuracy, which is a common functional failure (Tan et al., 2017). A second capability of AI chatbots is the ability to provide alternatives to human support. Artificial intelligence (AI) chatbots are now capable of handling simple and standard requests with ease. However, humans must be involved in assistance when customer requests are unusual, rare, or complex (Ba et al., 2010). Here, the AI chatbot has to be able to detect when customers require human help and respond appropriately to lessen the blow of bad service. Thirdly, unlike traditional SST technology, AI chatbots are capable of learning on their own. With the use of machine learning and big data, the spectrum of problems that AI chatbots can tackle will increase as they handle more and more challenges. Customers may notice an improvement in the chatbot's intelligence and service quality after using it for a while. Personalized guidance is the fourth component. In order to provide efficient customer service, personalized recommendations are essential (Zhang et al., 2011).

AI systems may learn client preferences in real-time by collecting and analyzing data on their online activities. This allows for more targeted recommendations. The four most popular AI chatbots in use today provide the groundwork for customers to make an informed decision about an AI chatbot's reliability. Customers' perceptions of a service provider's warmth, kindness, and empath, Patience, friendliness, and concern shape their affective trust (Johnson and Grayson, 2005). Empathy was a key design principle for creating the AI-powered interactive service system (Yalcin and Dipaola, 2018). Frontline employees' empathy is continuously ranked high among critical competencies, and AI chatbots' ability to comprehend and respond to customers' emotions is a key factor in their happiness (Varca, 2009). The ability of AI to provide accurate recommendations does double duty: it lets customers see how smart the machines are in terms of computation and service, and it makes them feel understood by making them think the chatbot is paying attention to what they need. This builds trust, both emotionally and intellectually. Hence, the study proposes the following hypothesis:

H2. Symbolic recovery provided by AI chatbots has a positive impact on trust towards AI chatbots.

AI chatbot symbolic recovery and satisfaction

A customer's degree of satisfaction with a service or product reflects their feelings after utilizing it. Studies by Oliver (1997) and Arora and Narula (2018) suggest that customer satisfaction is influenced by how closely pre- and post-consumption experiences align with their expectations. Numerous studies, including those by Arora and Narula (2018) and Liang et al. (2020), have examined the connection between satisfied customers and quality service. According to Deng et al. (2010), the quality of service has a significant effect on customer satisfaction. Our study supports H1, indicating that when the perceived advantages of AI chatbot services are enhanced, it reduces perceived costs, such as time, energy, and learning. Studies from Chen et al. (2019) and Xu et al. (2015) show that customers tend to feel more satisfied when they view a service as having substantial value. Thus, we propose the following hypothesis:
H3: Symbolic recovery chatbots positively influence customer satisfaction.

Relationship between perceived value, trust, satisfaction, and tourist loyalty

Tourist loyalty is characterized as "a strong dedication to repeatedly purchase or engage with a preferred product/service" (Hoehle and Venkatesh, 2015). Even in light of unfavorable information about the company, the attitudes and actions of loyal customers tend to remain unchanged (Yuan et al., 2020). Serving as the primary point of contact for customer service, an AI chatbot engages with users. The findings here indicate that consumer loyalty is affected by their perceptions of AI chatbots. As stated by Yang and Peterson (2004), marketing strategies employed by companies are centered around customer value. Numerous studies (Hurley and Laitamaki, 1995; Yang and Peterson, 2004; Hsiao and Chen, 2016) have demonstrated through both quantitative and qualitative research that perceived value significantly impacts consumer loyalty. Customers are more likely to have a positive impression of a company's actions and intentions when they trust them (Hohenstein and Jung, 2020). When it comes to AI chatbot services, cognitive trust is when customers have faith in the chatbots' abilities (Chai et al., 2015), and emotional trust is when customers feel something about how appealing the chatbots are. When customers have faith in AI chatbots on an emotional and cognitive level, it makes them feel good about the company. The trust transfer theory states that customers put their faith in businesses rather than AI chatbots (Lu et al., 2011). In addition, Aoki (2020), Floh and Treiblmaier (2015), Harris and Goode (2004), and Ribbink et al. (2004) have all shown that trust has a positive effect on organizational loyalty.

Customer satisfaction is often cited as a key component impacting tourist loyalty in loyalty literature (Deng et al., 2010). The literature review by Arora and Narula (2018) examined the connection between happy customers, loyal customers, and high-quality service. As a result, this is our method of operation hypothesis:

H4: The tourist’s perceived value has a positive impact on tourist loyalty.

H5: The tourist’s effective trust towards AI chatbots is positively correlated with tourist loyalty.

H6: Tourist satisfaction with AI chatbots is positively correlated with tourist loyalty.

H7: AI chatbot symbolic recovery has a direct and significant impact on tourist loyalty through the mediating role of perceived value, trust, and satisfaction.

Sample Selection and Data Collection

A total of 550 questionnaires were distributed online via social media platforms, as the objective of this research pertains to chatbot users, making online surveys an appropriate method for data collection (Rhim et al., 2022). Data collection occurred from October to December 2024. Out of the responses, only 500 were deemed valid and suitable for analysis. We utilized convenience sampling, which allows for gathering participants from accessible and convenient locations (Kowalczyk, 2015).

The questionnaire is divided into two sections. The first section includes 6 categories. The first category comprises 5 statements related to assurance. The second category contains 5 items focused on empathy. The third category has 5 items concerning responsiveness. The fourth category consists of 6 statements related to trust. The fifth category includes 5 statements pertaining to perceived value, and the sixth category contains 5 statements regarding satisfaction, while the final category consists of 4 statements related to loyalty.

The second section of the questionnaire features 6 items aimed at collecting demographic information, which encompasses gender, age, educational level, familiarity with AI, and the use of AI as an information source. This study utilized SPSS, Version 29, to test hypotheses through simple and multiple regression, while Lisrel 8.80 was employed to validate hypothesis 7 via path analysis.

Measures

To ensure the content validity of the assessment, the measurement items chosen must adequately reflect the concept for which generalizations are to be made (Ayre and Scally, 2014). We employed a 5-point Likert scale, with 1 denoting "strongly disagree" and 5 denoting "strongly agree." The questionnaire questions of empathy were adapted from Pitt et al. (1995), while questions of assurance are adapted from Mayer and Davis (1999). Subsequently, responsiveness questions are derived from the prior research conducted by Venkatesh et al. (2011). The 'perceived value' questions were assessed based on Harris and Goode (2004). The questions of 'Satisfaction' were adapted from Fang et al. (2014). Consequently, our study assessing tourist loyalty is based on questions generated by many scholars (Fang, 2019; Gupta and Kabadayi, 2010; Yang et al., 2006).

Results of the study

Demographics of respondents

Table (1): Demographic data analysis

Variables	Items	Frequencies	Percentage (%)
Gender	Male	204	40.8
	Female	296	59.2
Age	Less than 20	90	18
	20-30	165	33
	31-40	189	37.8

Variables	Items	Frequencies	Percentage (%)
	More than 41	56	11.2
Educational level	Senior High school	142	28.4
	Bachelor's degree	256	51.2
	Master's degree and beyond	102	20.4
Are you familiar with the AI chatbot service?	Yes	410	82
	No	90	18
Have you ever use AI chatbot as one of your obtaining information channels?	Yes	489	97.8
	No	11	2.2
Which kind of products or services do you mostly interactive with AI chatbot to help online?	Reservation of Hotels	132	26.4
	Car rental service	44	8.8
	Airline tickets	115	23
	Travel services	120	24
	Sightseeing service	86	17.2
	Others	3	0.6

Source: created by authors

Table 1 indicates that the research sample comprises 500 respondents, with 59.8% of respondents being female and 48.8% male. The majority of respondents, comprising 72.1%, were aged between 31 and 40 years. This was followed by those aged 20 to 30 years, representing 33%. Eighteen respondents were under 20 years old, while only 11.2% were over 41 years old. The majority of respondents had bachelor's degrees, accounting for 51.2%, followed by high school graduates at 28.4% and those with master's degrees or above at 20.4%.

Regarding acquaintance with AI chatbot services, 82% of respondents were acquainted with prior services, while just 18% were not. Regarding the use of AI chatbots as information sources, 98.2% employed AI chatbots, while just 2.2% did not. In terms of online customer assistance services, hotel reservations ranked highest at 26.4%, followed by travel services at 24%, airline tickets at 23%, sightseeing services at 17.2%, and vehicle rental services at 8.8%.

Table (2) Descriptive Statistics

	Number	Minimum	Maximum	Mean	Std. Deviation
Empathy	500	7.00	20.00	12.6800	3.51259
Assurance	500	4.00	18.00	13.0360	3.51332
Responsiveness	500	6.00	20.00	13.7820	4.03920
Perceived Value	500	5.00	20.00	12.9280	3.72055
Trust	500	7.00	20.00	13.1820	3.00448

	Number	Minimum	Maximum	Mean	Std. Deviation
Satisfaction	500	4.00	20.00	12.9400	3.52438
Tourist loyalty	500	5.00	20.00	13.5000	3.82404

Source: created by authors

Table (2) shows that all the data appears to be normal, and the degree of deviation is satisfactory.

Measurement Model

The Pearson correlation was used to calculate the internal consistency between items and the overall score.

Table (3) Pearson's Correlation Value

Dimensions	N	Correlations	N	Correlations	*N*	Correlations	N	Correlations
Empathy	1	0.853	2	0.793	3	0.853	4	0.850
Assurance	1	0.808	2	0.807	3	0.806	4	0.773
Responsiveness	1	0.910	2	0.851	3	0.913	4	0.843
perceived value	1	0.792	2	0.799	3	0.834	4	0.853
Trust	1	0.784	2	0.756	3	0.763	4	0.883
Satisfaction	1	0.807	2	0.833	3	0.802	4	0.804
tourist loyalty	1	0.817	2	0.786	3	0.856	4	0.819

Source: created by authors

Table (3) indicates that the Pearson correlation between the items and the variables varied from 0.756 to 0.913. These values are statistically acceptable, indicating a strong level of internal consistency and validity.

Reliability

Alpha Cronbach was used by the researcher in order to determine the dependability. The values of the coefficients for each variable are shown in table (4).

Table (4) The Coefficient Value of Alpha Cronbach

N	Dimensions	Number of Items	Cronbach's Alpha
1	Empathy	4	0.851
2	Assurance	4	0.808
3	Responsiveness	4	0.901
4	perceived value	4	0.835
5	Trust	4	0.805

N	Dimensions	Number of Items	Cronbach's Alpha
6	Satisfaction	4	0.821
7	tourist loyalty	4	0.837

Source: created by authors

Table 4 indicates that the reliability values of the questionnaire ranged from 0.805 to 0.901, and these values are statistically supported, implying a strong level of reliability.

A multiple linear regression model using the stepwise technique is used to investigate the validity of the study hypotheses.

Table (5) Multiple regression analysis for chatbot symbolic recovery on perceived value

Model	Unstandardized Coefficients		Beta	T	Sig.	R	R^2	F	Sig.
	B	Std. Error							
Empathy	.102	.031	.096	3.332	0.01				
Assurance	.545	.036	.514	15.281	0.01		0.768	545.791	0.01
Responsiveness	.322	.032	.350	10.035	0.01				

Hypothesis 1

AI chatbot symbolic recovery has a positive impact on user-perceived value of chatbots.

Table (5) shows that the R Square value is 0.768, indicating that 76.8% of the perceived value is accounted for by empathy, assurance, and responsiveness, as the F value is statistically significant. Furthermore, the beta coefficients for these variables are significant at a p-value of 0.01. Among these, assurance (0.514) exhibits the strongest statistically significant positive influence (0.96) on users' perceived value of chatbots, followed by responsiveness (0.350), and lastly, empathy (0.96).

H2: Symbolic recovery provided by AI chatbots has a positive impact on trust towards AI chatbots

Table (6) shows that the R Square value is (0.325), suggesting that 32.5% of the variation in trust can be attributed to empathy, assurance, and responsiveness since the F value is statistically significant and the beta coefficients for these variables are significant at ($p < 0.01$). The beta coefficient for assurance is 0.303, for responsiveness it is 0.226, and for empathy, it stands at 0.105. Thus, assurance exerts the greatest positive influence on trust, followed by responsiveness and then empathy.

Table (6) Multiple regression analysis for chatbot symbolic recovery on trust

Model	Unstandardized Coefficients		Beta	T	Sig.	R	R^2	F	Sig.
	B	Std. Error							
Constant	6.350	.469		13.543	0.01	0.570	0.325	79.477	0.01
Empathy	0.090	.042	.105	2.123	0.05				
Assurance	0.259	.049	.303	5.288	0.01				
Responsiveness	0.168	.044	.226	3.802	0.01				

Source: created by authors

H3: Symbolic recovery chatbots positively influences customer satisfaction.

Table (7) Multiple regression analysis for chatbot symbolic recovery on satisfaction

Model	Unstandardized Coefficients		Beta	T	Sig.	R	R^2	F	Sig.
	B	Std. Error							
Constant	0.747	.282		2.644	0.01	0.907	0.822	764.100	0.01
Empathy	0.134	.025	.034	5.360	0.01				
Assurance	0.814	.030	.812	27.585	0.01				
Responsiveness	0.083	.027	.095	3.112	0.01				

Source: created by author

Table (7) shows that the R Square value is 0.822, indicating that 82.2% of the variation in satisfaction can be accounted for by empathy, assurance, and responsiveness. Given that the F value is statistically significant and the beta coefficients for these variables are valid at (p 0.01), we can draw meaningful conclusions. The beta coefficient for assurance is 0.812, while responsiveness is 0.095, and empathy is 0.034. Consequently, assurance has the strongest positive impact on satisfaction, followed by responsiveness and then empathy.

H4: The tourist's perceived value has a positive impact on tourist loyalty.

As indicated in table (8), the R Squared value stands at 0.727, suggesting that perceived value explains 72.7% of the variance in tourist loyalty. This finding is backed by the statistically significant F value and the noteworthy beta coefficient for these variables at p 0.01. There exists a positive correlation between a tourist's perceived value and their loyalty.

Table (8) Simple regression analysis

Model	Unstandardized Coefficients		Beta	T	Sig.	R	R^2	F	Sig.
	B	Std. Error							
Constant	2.169	.324		6.703	0.01	0.853	0.727	1327.194	0.01
perceived value	0.876	.024	.853	36.431	0.01				

Source: created by authors

H5: The tourist's effective trust towards AI chatbots is positively correlated with tourist loyalty.

Table (9) Simple regression analysis

Model	Unstandardized Coefficients		Beta	T	Sig.	R	R^2	F	Sig.
	B	Std. Error							
Constant	3.850	.631		6.104	0.01	0.575	0.331	246.188	0.01
Trust	0.732	.047	.575	15.690	0.01				

Source: created by authors

As shown in table 9, the R Square value stands at 0.575, indicating that trust explains 57.5% of the variability in tourist loyalty. This is corroborated by the statistically significant F value and the significant beta coefficient for these variables at p 0.01. This implies that customer loyalty is closely linked to the level of trust tourists have in AI chatbots.

H6: Tourist satisfaction with AI chatbots is positively correlated with tourist loyalty.

Table (10) Simple regression analysis

Model	**Unstandardized Coefficients**		**Beta**	**T**	**Sig.**	**R**	**R^2**	**F**	**Sig.**
	B	**Std. Error**							
Constant	2.846	.425		6.702	0.01	0.759	0.576	675.863	0.01
Satisfaction	0.823	.032	.759	25.997	0.01				

Source: created by authors

Table (10) shows that R Square is equal to 0.576, suggesting that 57.6% of the variability in tourist loyalty can be attributed to satisfaction, given that the F value is statistically significant and the beta coefficient for these variables is meaningful at (p

0.01). Thus, there is a positive relationship between tourist satisfaction with AI chatbots and tourist loyalty.

The structural model

H7: AI chatbot symbolic recovery has a direct and significant impact on tourist loyalty through the mediating role of perceived value, trust, and satisfaction.

Path analysis and structural equation modeling, constructed using LISREL 8.80, are used to assess the validity of hypothesis 7.

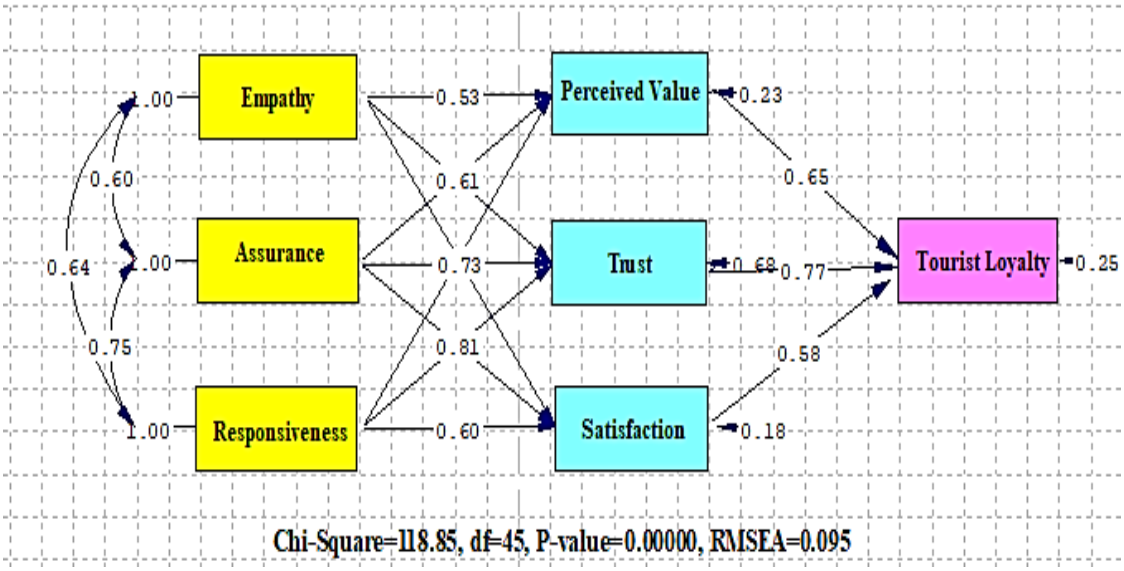

Figure 4. Structural Equation Modeling

Source: created by authors

Figure (4) shows that the model has adjusted with the data to improve Goodness-of-fit indices.

Table (11) Model–Data Fit Indication

N	Fit indices	Values
1	X 2 / df (CMIN)	2.641
2	RMR	0.03
3	GFI	0.94
4	AGFI	0.92
5	NFI	0.98
6	NNFI	0.92
7	RFI	0.92
8	IFI	0.98
9	CFI	0.98
10	RMSEA	0.095

Table (11) shows that the measurement model has been refined using the data to enhance the goodness-of-fit indices. The following indices were obtained post-modification: RMSEA = 0.095, CFI = 0.98, NFI = 0.98, RFI = 0.92, IFI = 0.98, and $\chi^2/df = 2.64$.

Table (12) Values of the direct, indirect, and total effects of the independent latent variable in the dependent latent variables

N	Track			Effect	Std. Error	T
1	Empathy	--->	Perceived value	0.53	0.029	18.27**
2	Empathy	--->	Trust	0.61	0.049	12.44**
3	Empathy	--->	Satisfaction	0.33	0.025	13.20**
4	Assurance	--->	perceived value	0.51	0.034	15.30**
5	Assurance	--->	Trust	0.30	0.057	5.29**
6	Assurance	--->	Satisfaction	0.81	0.029	27.5**
7	Responsiveness	--->	perceived value	0.35	0.035	10.06**
8	Responsiveness	--->	Trust	0.23	0.059	3.79**
9	Responsiveness	--->	satisfaction	0.09	0.031	3.15**
10	perceived value	--->	tourist loyalty	0.65	0.020	32.5**
12	Trust	--->	tourist loyalty	0.77	0.030	25.66**
13	Satisfaction	--->	tourist loyalty	0.58	0.026	22.30**

Source: created by authors

Table 12 indicates that empathy has a direct significant impact ($p < 0.01$) on perceived value; it also has a direct significant impact (0.01) on trust. Additionally, it has a direct, significant impact ($p < 0.01$) on satisfaction. While assurance has a direct significant impact ($p< 0.01$) on perceived value. and on trust ($p <0.01$). In addition, assurance directly has a significant impact ($p < 0.01$) on satisfaction. Furthermore, responsiveness has a direct, significant impact ($p < 0.01$) on perceived value and has a direct, significant impact ($p < 0.01$) on trust. Also, it has a direct, significant impact ($p < 0.01$) on satisfaction. And as shown in the above table, perceived value, trust, and satisfaction have all had a direct, significant impact (0.01) on tourist loyalty.

Discussion

The present study examines how the aspects of chatbot symbolic recovery powered by AI—empathy, assurance, and responsiveness—affect tourist loyalty, with perceived value, trust, and satisfaction acting as mediators. The results endorse the proposed framework, demonstrating that the positive impact of AI chatbot symbolic recovery (empathy, assurance, and responsiveness) on tourist loyalty is facilitated by the mediating factors of perceived value, trust, and satisfaction. This result aligns with earlier studies (e.g., Jenneboer et al., 2022). The findings from the study indicated that

the symbolic recovery of AI chatbots, which includes empathy, assurance, and responsiveness, has a positive correlation with users' perceived value of these chatbots. This aligns with the conclusions drawn from multiple earlier studies (Chen et al., 2022; Thaichon et al., 2014; Kettinger et al., 2009). These studies reported that the quality of AI services could enhance perceived benefits or lower costs. Similarly, AI chatbot symbolic recovery has a positive impact on trust towards AI chatbots, which aligns with the previous studies (Chen et al., 2022; Varca, 2009).

Moreover, the research indicates that the symbolic recovery provided by AI chatbots positively influences trust in AI chatbots, which is consistent with earlier research (Chen et al., 2019; Xu et al., 2015; Arora and Narula, 2018; Liang et al., 2020; Deng, 2010). These studies have found that tourists who view a service as valuable are more likely to be satisfied. Furthermore, service quality was identified as a significant factor predicting customer satisfaction. The study also proposes that the tourists' perceived value is positively correlated with tourist loyalty, a result that is in agreement with prior research (Kim et al., 2015; Pena et al., 2012; Gallarza and Saura, 2006). These studies demonstrated that tourists who perceive high value tend to exhibit greater loyalty and are more inclined to make repeat visits.

Additionally, the research demonstrates that a positive relationship exists between the loyalty of tourists and trust. This finding aligns with previous research (Aoki, 2020; Floh and Treiblmaier, 2015; Harris and Goode, 2004; Ribbink et al., 2004), which reported that trust is fundamental in fostering customer loyalty. Furthermore, the research reveals that satisfaction is also positively related to tourist loyalty, and this finding aligns with Cheng et al. (2016), Chi and Qu (2008), and Milman and Tasci (2018). These studies illustrate that tourists who enjoy a satisfying experience at a destination are more likely to return and are inclined to share their positive experiences by recommending it to others.

Theoretical implications

The study gives a novel contribution to AI chatbot literature because limited previous research in Egypt has examined the correlations between AI chatbot symbolic recovery, tourist loyalty, satisfaction, perceived value, and trust in the tourism context. Therefore, this study presents new insights into this field by integrating the study variables into one framework. In other words, the positive influence of AI chatbot symbolic recovery on tourist loyalty could be subject to the development of satisfaction and perceived value, as well as trust.

Practical implications

In addition to its theoretical contributions, this research explores the relationship between theory and practical application. by offering suggestions for businesses in the tourism and hospitality industry. Specifically, managers in these fields should focus on the quality of chatbot services as a strategy for encouraging repeat business. By regularly monitoring chatbot performance metrics such as resolution rates, response times, and customer satisfaction, they can determine opportunities for enhancement. Rather than delivering generic apologies, chatbots should provide customized responses that cater to the specific issue and the unique situation of the tourist. This approach allows tourism companies to not only resolve immediate concerns but also

to foster more robust and enduring connections with their customers, encouraging loyalty and repeat transactions.

Tourism and Hospitality staff should receive training on the capabilities of the chatbot, including its features and efficient usage. This will guarantee that they are able to offer the greatest service to tourists and smoothly incorporate the chatbot into their workflow. Furthermore, through their interactions, chatbots can identify tourists who have experienced displeasure. This allows staff to follow up with these tourists to address their complaints and provide suitable service recovery measures.

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