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How Customer Technology Readiness Sparks Hotel Brand Evangelism: The Roles of Empathy, Admiration, and Technological Empowerment

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Abstract
This study examines how customers' technology readiness influences brand evangelism in five-star hotels in Egypt using the Stimulus–Organism–Response (SOR) Theory. The objective is to develop and test a moderated–mediation model in which perceived empathy and brand admiration function as mediators, while perceived technological empowerment moderates the relationship between brand admiration and brand evangelism. Data were collected from 442 hotel customers and analyzed using partial least squares structural equation modeling (PLS-SEM) with WarpPLS to test the hypothesized relationships, mediation effects, and moderation effects. The results show that customer technology readiness significantly enhances perceived empathy and brand admiration, which in turn positively affect brand evangelism. Mediation analysis confirms that technology readiness influences brand evangelism indirectly through empathy and admiration. Furthermore, perceived technological empowerment strengthens the positive relationship between brand admiration and brand evangelism. The findings suggest that hotels seeking to foster brand advocacy should integrate technology initiatives with emotional engagement strategies and empower customers through user-friendly digital systems. Managers are encouraged to design technology-enabled services that enhance feelings of empathy, control, and admiration to stimulate voluntary brand promotion. This study contributes to SOR-based research by extending technology readiness literature into brand evangelism outcomes and by demonstrating the joint role of emotional mechanisms and technological empowerment in shaping customer advocacy in hospitality contexts.

Key Words: Customer Technology Readiness, Brand Evangelism, Perceived Empathy and Brand Admiration, Perceived technological empowerment, Hospitality businesses.

JEL Classification: M31, L83, O32.

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1. Introduction

The hospitality industry is undergoing rapid digital transformation as hotels increasingly adopt advanced technologies such as AI-powered concierge services, mobile check-in/out systems, voice-activated room controls, and IoT-enabled smart rooms (Sheoran, 2025; Purnomo et al., 2025; Khairy et al., 2026). This transformation reflects the broader impact of the Fourth Industrial Revolution, in which automation, data analytics, and interconnected systems reshape service delivery and customer expectations (Liu et al., 2024; Osei & Cheng, 2024). While these technological innovations improve operational efficiency and convenience, they also present an important challenge for hospitality

organizations: integrating advanced technologies while maintaining the human-centered nature of hospitality, particularly empathy, personalization, and emotional connection (Al-Romeedy et al., 2025; Jain & Mitra, 2025). Guests increasingly seek efficient digital services, but they simultaneously expect to feel understood, respected, and emotionally supported during their stay (Alnasser, Alkhozaim, 2024; Blüher et al., 2025; Khairy et al., 2026).

Within this technology-driven environment, customer technology readiness (CTR) has emerged as an important determinant of how guests interact with and evaluate digital hotel services. CTR refers to an individual's propensity to embrace and effectively use new technologies (Ma et al., 2022; Ho et al., 2025). Customers with higher levels of technology readiness are generally more willing to adopt AI-enabled services such as automated concierge systems, smart room controls, and digital service platforms, perceiving them as convenient and aligned with their expectations. Previous studies have demonstrated that technology readiness significantly influences technology adoption, service evaluation, and behavioral intentions in hospitality settings (Kim & Han, 2022; Kim et al., 2020; Long et al., 2018). However, much of this research has focused primarily on technology acceptance or usage intentions, offering limited insights into how technology readiness may trigger deeper emotional responses toward the brand.

In technology-mediated service encounters, emotional perceptions remain central to hospitality experiences. One such emotional perception is perceived empathy (PE), which reflects customers' belief that their needs, preferences, and emotions are recognized and appropriately addressed (Onyeonoro et al., 2024; Schmidmaier et al., 2024; Shao et al., 2025). Traditionally associated with interpersonal service interactions, empathy is increasingly being facilitated through technology-enabled services such as personalized interfaces, AI-based recommendations, and responsive digital communication systems. Recent research suggests that such technologies can convey cues of artificial empathy, enabling customers to perceive digital service interactions as attentive and emotionally responsive (Chotisarn & Phuthong, 2025; Manoharan & Ashtikar, 2025; Assiouras et al., 2025). These empathetic perceptions may contribute to stronger emotional connections between customers and hospitality brands.

Another relevant emotional construct is brand admiration (BA), defined as a positive affective attitude characterized by respect, inspiration, and appreciation toward a brand (Park et al., 2016; Castro-González et al., 2019). When hospitality organizations successfully integrate technological efficiency with emotionally supportive service experiences, customers may develop stronger admiration for the brand. Such admiration goes beyond satisfaction or loyalty and reflects deeper emotional bonds that strengthen long-term customer–brand relationships (Ahmad et al., 2023; Tosun & Tavşan, 2024; Barbosa, Dias & Ferreira, 2024). These emotional connections are particularly important because they can motivate customers to actively advocate for the brand.

In this regard, brand evangelism (BE) represents a highly valuable behavioral outcome for hospitality organizations. Brand evangelism refers to enthusiastic, voluntary behaviors through which customers actively recommend, defend, and promote a brand to others (Sharma & Khandeparkar, 2025). Unlike traditional loyalty, brand evangelism involves proactive advocacy that enhances brand reputation and competitive advantage (Mansoor & Paul, 2022; Selmi et al., 2024; Leong et al., 2025). In highly competitive hospitality markets, cultivating brand evangelists can significantly strengthen brand equity and customer acquisition. Despite its importance, limited research has examined how technology-related experiences in hotels ultimately stimulate brand evangelism through emotional mechanisms.

Although the literature on smart hotels and digital service technologies continues to grow, several research gaps remain. First, existing studies have largely relied on frameworks such as the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), which focus primarily on technology adoption and usage intentions rather than on emotional and brand-related outcomes (Kim & Han, 2022). Second, limited research has examined how customer technology readiness translates into emotional responses such as perceived empathy and brand admiration within technology-enabled hospitality environments. Third, despite increasing interest in digital service experiences, the pathways through which technology-related perceptions ultimately lead to brand evangelism remain underexplored,

particularly in hospitality contexts and emerging markets (Kim et al., 2020; Ho et al., 2025). Addressing these gaps is essential for understanding how digital transformation can generate not only operational benefits but also strong customer–brand relationships.

To address these gaps, this study adopts the Stimulus–Organism–Response (SOR) framework (Mehrabian & Russell, 1974). Within this framework, customer technology readiness (CTR) represents the stimulus that shapes customers' internal evaluations, while perceived empathy (PE) and brand admiration (BA) represent organismic emotional states. These internal responses subsequently influence brand evangelism (BE) as the behavioral outcome. In addition, this study introduces perceived technological empowerment (PTE) as a moderating factor that strengthens the relationship between brand admiration and brand evangelism. Technological empowerment reflects customers' perceived autonomy and control when interacting with digital service technologies (Aw et al., 2023), and prior research suggests that such empowerment can enhance customer engagement and advocacy behaviors in digital service environments (Gupta & Prusty, 2024; Zhang et al., 2025; Giang et al., 2024).

The hospitality and tourism industry provides a particularly appropriate context for examining these relationships because service encounters are highly experiential and emotionally driven. Empathy, emotional connection, and service quality strongly influence customer satisfaction and behavioral intentions in tourism settings (Onyeonoro et al., 2024; Özcan et al., 2024; Aly, 2025). Emotional brand responses such as admiration further contribute to customer loyalty and brand advocacy within hospitality environments (Morrison & Crane, 2007; Ahmad et al., 2023; Tosun & Tavşan, 2024). Moreover, the rapid integration of AI-enabled services and smart technologies reinforces the relevance of studying technology readiness, artificial empathy, and empowerment in hotel contexts (Kim & Han, 2022; Liu et al., 2024; Assiouras et al., 2025).

This study focuses specifically on five-star hotels, which represent a highly service-intensive and technology-oriented segment of the hospitality industry. Guests in luxury hotels typically expect advanced technological services, personalized experiences, and superior emotional engagement during their stay (Abdalla et al., 2015; Özcan et al., 2024; Aly, 2025). In addition, customers in this segment often have greater exposure to digital technologies and higher expectations regarding service differentiation. Therefore, examining five-star hotels provides a theoretically appropriate context for exploring how technology readiness, perceptions of empathy, empowerment, and brand advocacy interact.

Accordingly, this study investigates whether customer technology readiness influences perceived empathy and brand admiration; whether perceived empathy mediates the relationship between technology readiness and brand admiration; whether brand admiration leads to brand evangelism; and whether perceived technological empowerment moderates the admiration–evangelism relationship. By integrating technological, emotional, and brand-related constructs within a unified SOR framework, the study provides a deeper understanding of how digital service experiences can foster strong customer advocacy in smart hospitality environments.

2. Literature review and hypotheses development

2.1 Underpinning theory

The Stimulus–Organism–Response (SOR) theory provides a powerful lens for understanding how hotel customers' perceptions and emotional states translate into meaningful behavioral outcomes. Originally proposed in environmental psychology, SOR explains that external environmental stimuli (S) activate internal cognitive and emotional processes (O), which then drive observable behavioral responses (R) (Mehrabian & Russell, 1974; Pratminingsih et al., 2024). In the hospitality context, technological advancements—such as mobile check-in, digital concierge services, smart room technologies, and self-service kiosks—function as key stimuli that shape customers' psychological evaluations of the service encounter (Fan et al., 2023). Hotel guests increasingly rely on digital interfaces

to navigate their stay, making their technology readiness and perceived technological empowerment central drivers shaping their brand experience (Kim & Han, 2022). Thus, SOR offers a suitable theoretical foundation to explain how technologically driven cues in the hotel environment trigger emotional and attitudinal reactions that ultimately influence customer behavior.

Within this framework, Customer Technology Readiness and Perceived Technological Empowerment act as the stimuli that shape hotel guests' internal evaluations of the brand experience. These technological stimuli influence the organism stage, represented by guests' perceived empathy (how cared for and understood they feel by the hotel) and brand admiration (their emotional attachment and positive regard for the brand). When guests feel empowered by hotel technologies and perceive the hotel as empathetic in addressing their needs, they develop deeper admiration and emotional engagement with the brand. These internal affective states then lead to the response, expressed as brand evangelism, where customers actively promote and advocate for the hotel brand. The moderating effect of perceived technological empowerment enhances the strength of this emotional-to-behavioral transformation, illustrating that empowered guests are more likely to translate admiration into enthusiastic brand advocacy. Thus, SOR theory fully explains the sequential and moderated relationships in the model, offering a coherent theoretical basis for understanding hotel customers' technology-driven brand engagement.

2.2 Customer technology readiness and brand admiration

Customer Technology Readiness (CTR) reflects the degree to which individuals feel competent and willing to adopt and utilize new technologies (Lin & Hsieh, 2006). In the hospitality context, CTR can significantly shape customer perceptions of brand sophistication and service quality. Customers who are confident in using digital platforms, AI-enabled services, or smart hotel technologies are more likely to perceive a brand as innovative, modern, and customer-centric (Chotisarn & Phuthong, 2025; Khairy et al., 2026).

From the Stimulus-Organism-Response (SOR) perspective, CTR acts as a stimulus that directly influences the organismic state—in this case, the formation of positive brand attitudes such as admiration. Prior research has shown that technology adoption often correlates with enhanced brand perceptions, satisfaction, and loyalty in service industries (Dianawati et al., 2024). Thus, it is reasonable to expect that technologically ready customers will exhibit stronger admiration for hotel brands that provide advanced, tech-enabled services.

Several studies support this reasoning. Kim and Han (2022) explore how technology readiness affects consumer behavior and attitudes toward "smart hotels," finding that CTR is a critical antecedent in models of hotel technology adoption and positively shapes consumer evaluations of smart hotel services. Similarly, Kim et al. (2020) demonstrate that technology readiness dimensions—such as optimism and innovativeness—moderate the effects of smart hotel attributes on attitude and word-of-mouth intentions. While their primary outcome is behavioral (word-of-mouth), the mechanism relies on the formation of positive attitudes among tech-ready guests, establishing a link between readiness and favorable brand perceptions.

Long et al. (2018) provide additional support by showing that optimism and innovativeness, key components of technology readiness, are positively associated with satisfaction among hotel guests. Although their study focuses on satisfaction rather than brand admiration, satisfaction is a foundational attitudinal outcome, suggesting that technology readiness can foster positive brand-related attitudes that may extend to admiration. More recently, Han et al. (2024) combine technology readiness with emotional and attitudinal factors to explain hotel guests' choices of smart products. The inclusion of affective variables highlights that CTR can influence not only usage intention but also how guests feel about the hotel brand. Based on this evidence, the following hypothesis is proposed:

H1. Customer technology readiness positively influences brand admiration.

2.3 Customer technology readiness and perceived empathy

Perceived empathy refers to the extent to which customers feel understood, cared for, and valued by service providers (Bove, 2019). Although empathy is traditionally associated with human interactions, technological interfaces — such as AI concierge services or personalized mobile applications — can also convey empathetic cues by anticipating customer needs, providing timely responses, or personalizing services. Indeed, recent research on "artificial empathy" suggests that AI-powered agents can simulate empathic behavior that influences customer outcomes positively (Assiouras et al., 2025). Customers with higher technology readiness are better equipped to navigate these systems effectively, interpret AI-mediated interactions, and thus are more likely to perceive them as empathic (Yoon & Lee, 2021).

Within the Stimulus-Organism-Response (SOR) framework, CTR functions as a stimulus that facilitates an affective response, shaping the organismic state represented by empathy. By enabling customers to interact efficiently with technology and perceive personalized attention, CTR enhances the likelihood of experiencing empathy, thereby creating an emotional connection to the brand.

Empirical studies support this link. Kim and Han (2022) find that technology readiness shapes consumers' overall evaluations of smart hotel services, suggesting that readiness may also influence how guests emotionally react to technology-mediated hospitality environments. Similarly, Kim et al. (2020) indicate that tech-ready guests respond more positively to technology-enabled hotel services, which may make them more receptive to perceiving such services as caring or empathetic, even though empathy was not directly measured. Based on this rationale, the following hypothesis is proposed:

H2. Customer technology readiness positively influences perceived empathy.

2.4 Perceived empathy and brand admiration

Perceived empathy functions as a critical organismic mechanism in the SOR model, translating customer perceptions and emotions into attitudinal outcomes. When customers feel understood and supported, they develop a stronger emotional connection to the brand (Morrison & Crane, 2007). In the hospitality context, empathy can manifest through attentive service, personalization, and responsive communication, all of which enhance brand evaluations. Indeed, research shows that empathy — as a dimension of perceived service quality — has a significant positive effect on customer satisfaction in hotel contexts (Abdalla et al., 2015). Empathetic experiences also contribute to increased loyalty and favorable brand attitudes via stronger customer–brand emotional bonds (Wang et al., 2025). Theoretically, the perception of empathy strengthens emotional attachment and supports attitudinal outcomes (such as admiration or brand love). Thus, customers who perceive higher empathy in hotel services are likely to exhibit greater admiration for the brand.

Several studies support this relationship. Özcan et al. (2024) find that empathy, as a dimension of perceived service quality, positively influences brand loyalty. When guests perceive service providers as empathetic—understanding, caring, and attentive—this significantly contributes to loyalty outcomes. Given that brand admiration is closely related to loyalty, these findings support the broader notion that perceived empathy enhances positive brand attitudes, including admiration. Ko et al. (2021) similarly show that customers' experiences of compassion, an empathic construct, positively affect brand attitudes; compassion experienced during service leads to more favorable brand evaluations through emotional and image-based processes. Zhang et al. (2023), in a non-hospitality consumer brand context, find that perceived empathy (termed "spiritual space empathy") significantly enhances brand attitude, highlighting the general psychological link between empathy and positive brand evaluations. Chen et al. (2022) further link customers' service evaluation and engagement to subsequent brand behavioral intentions, supporting the idea that how customers perceive and evaluate hotel services—including empathic service components—affects attitudinal and behavioral brand outcomes. Based on this evidence, the following hypothesis is proposed:

H3. Perceived empathy positively influences brand admiration.

2.5 Brand admiration and brand evangelism

Brand admiration reflects a strong emotional attachment characterized by respect, appreciation, inspiration, and favorable evaluation of a brand (Park et al., 2016; Castro-González et al., 2019). It represents an affective state in which customers develop deep psychological connection and positive identification with a brand beyond functional satisfaction. Within relationship marketing and emotional branding perspectives, such admiration strengthens brand–customer bonds and increases the likelihood of long-term relational engagement.

From the Stimulus–Organism–Response (SOR) perspective (Mehrabian & Russell, 1974), brand admiration functions as an organismic state that emerges from positive service experiences and subsequently drives behavioral responses. In hospitality environments, emotionally meaningful experiences activate admiration, which in turn motivates customers to act in support of the brand. One of the strongest behavioral manifestations of this emotional attachment is brand evangelism — defined as customers' enthusiastic, voluntary, and proactive advocacy behaviors aimed at promoting and defending a brand through recommendations, referrals, and public support (Sharma & Khandeparkar, 2025).

Brand evangelism extends beyond traditional loyalty or repeat patronage because it reflects active persuasion and identity-based advocacy. Admired brands generate trust, pride, and emotional attachment, encouraging customers to voluntarily communicate positive experiences and influence others (Ahmad et al., 2023; Tosun & Tavşan, 2024). Empirical evidence supports this relationship in hospitality and consumer-brand contexts. Mansoor et al. (2025) demonstrate that digital competence and supportive service environments enhance brand evangelism through positive brand perceptions, highlighting the role of emotional and cognitive brand evaluations as antecedents of advocacy behavior. Similarly, Mansoor and Paul (2022) show that brand-related positive emotions — such as brand prestige and brand happiness — significantly influence brand evangelism, even though brand admiration was not directly measured.

Further evidence indicates that relational constructs conceptually aligned with brand admiration — including brand love, attachment, and brand relationship quality — are strongly associated with advocacy intentions and recommendation behaviors (Ndhlovu & Maree, 2024; Selmi et al., 2024; Leong et al., 2025). In service industries, strong emotional bonds with brands translate into willingness to defend, recommend, and publicly support the brand, reinforcing its market position. Additionally, emotional connection and perceived service value have been shown to strengthen loyalty and behavioral advocacy in hospitality contexts (Wang et al., 2025; El-Adly et al., 2024). Accordingly, within technology-enabled hotel environments where customers experience empathy, empowerment, and personalization, brand admiration is expected to operate as a critical psychological driver that transforms positive affect into evangelistic behavior. Based on this evidence, the following hypothesis is proposed:

H4. Brand admiration positively influences brand evangelism.

2.6 Moderating role of perceived technological empowerment

Perceived technological empowerment (PTE) refers to customers' perceptions of autonomy, control, and competence when interacting with technology-enabled services (Aw et al., 2024). As a moderating variable, PTE is expected to strengthen the effect of brand admiration (BA) on brand evangelism (BE). Even when customers admire a brand, the extent to which this admiration translates into advocacy may depend on their sense of empowerment: customers who feel capable of navigating technology confidently are more likely to act on positive emotions, engaging in word-of-mouth promotion and brand advocacy (Gupta & Prusty, 2024; Talukder et al., 2024). Within the SOR

framework, PTE influences the pathway from the organismic state (BA) to the behavioral response (BE), serving as a boundary condition that amplifies the effect of positive attitudes on actual behavior.

Empirical evidence supports this moderating role. Zhang et al. (2025) show that features of omnichannel innovation—such as system flexibility and personalization—enhance customer empowerment, which in turn boosts brand loyalty. Although the outcome studied is loyalty rather than evangelism, the underlying logic is similar: when customers feel empowered by technology, their relationship with the brand strengthens. Giang et al. (2024) further demonstrate that customer empowerment positively impacts engagement behaviors on sharing platforms, supporting the broader claim that empowerment fosters stronger consumer–brand engagement and willingness to act. Mansoor et al. (2025), in a hospitality context, find that digital competence and proactive service attributes—analogous to technological empowerment—help generate brand evangelism through brand image. While empowerment was not explicitly tested as a moderator, these findings suggest that when customers perceive a brand's digital capabilities positively, the translation of positive brand perceptions into evangelistic behaviors is more effective. Based on this reasoning, the following hypothesis is proposed:

H5. Perceived technological empowerment moderates the effect of brand admiration on brand evangelism such that the relationship is stronger when perceived technological empowerment is high.

2.7 Mediation of perceived empathy

Beyond its direct effects, perceived empathy is expected to mediate the relationship between customer technology readiness (CTR) and brand admiration (BA). Research on intelligent hospitality technologies shows that customers' readiness to use technology significantly shapes their responses to smart-hotel services (Han et al., 2024). While CTR may directly influence brand admiration by signaling technological competence and sophistication, it can also indirectly foster admiration by enabling customers to perceive empathy more effectively. In this mediated pathway, technology readiness acts as a stimulus that enhances the organismic state of perceived empathy, which in turn drives the attitudinal response of brand admiration. This conceptualization aligns with evidence from service and brand-emotion studies: for example, perceived compassion/empathy in service contexts (even in low-cost carriers) leads to more favorable brand attitudes via positive emotions and brand image formation (Ko et al., 2021). Moreover, studies in hospitality contexts suggest that empathetic, personalized, and responsive service increases customer satisfaction, loyalty, and positive brand evaluations — outcomes often tied to emotional attachment and brand admiration. Therefore, mediation analysis that places perceived empathy between CTR and BA can yield a more nuanced understanding of how technology readiness translates into attitudinal brand outcomes.

Several studies provide support for this mediated relationship. Kim et al. (2020) demonstrate that in a smart hotel context, customers' technology readiness traits—optimism and innovativeness—moderate how perceived hotel performance links to favorable attitudes and word-of-mouth intentions. Although the study does not explicitly measure empathy or brand admiration, it shows that CTR helps shape attitudinal and behavioral responses through customers' perceptions of smart hotel services, supporting the idea that CTR can influence deeper brand-related attitudes once the environment encourages favorable perceptions, which could include empathy.

El Naby et al. (2024) examine AI-based service experiences (e.g., chatbots) and their effects on satisfaction, loyalty, and word-of-mouth. While the mediator in their study is satisfaction rather than empathy, the findings indicate that technological service experiences—enabled by readiness and technology usage—indirectly influence brand-related behaviors. This suggests the plausibility of an empathy-mediated effect as well.

Assiouras et al. (2025) argue that technology, including AI agents and metaverse-based service environments, can evoke empathy ("artificial empathy") among customers, which subsequently affects their responses to hospitality services. This supports the theoretical possibility that technology-mediated

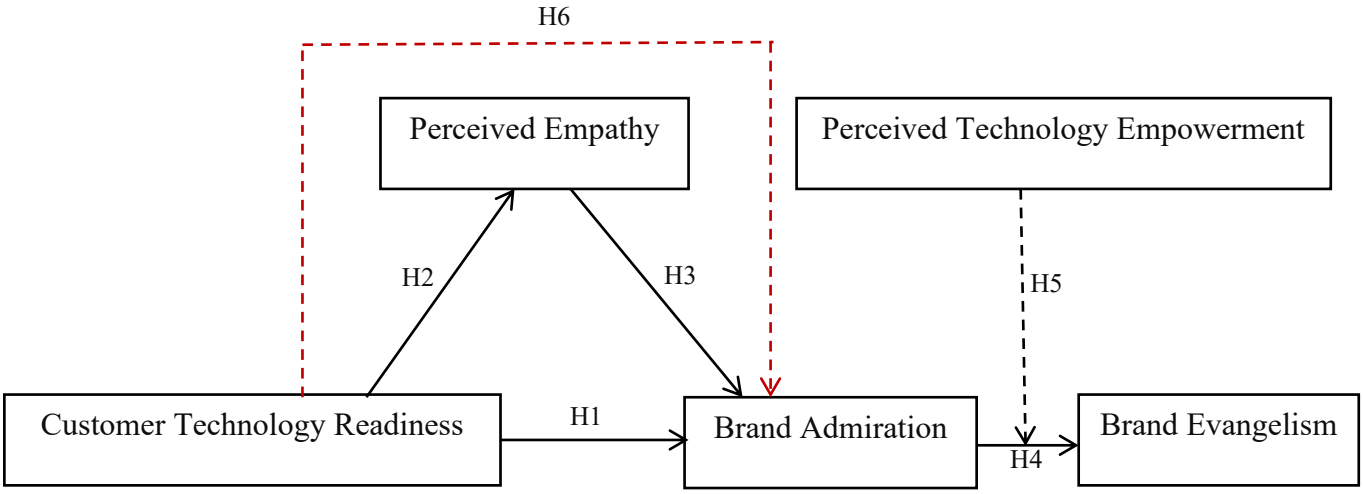
stimuli, when properly designed, can generate genuine empathic feelings in customers, fueling affective attitudes toward the brand.

Tai et al. (2021) further highlight that while both human-related service innovations (HRSI) and technology-related service innovations (TRSI) can improve satisfaction and delight, human-centered innovations—likely including empathy and personalization—exert a stronger influence. Technology alone may not suffice for forming deep brand attachments; emotional and affective responses remain critical. Within the logic of H4, technology readiness enables customers to use and accept TRSI, but the pathway to admiration likely involves empathy or human-centered service cues, underscoring the mediating role of perceived empathy. Based on this reasoning, the following hypothesis is proposed:

H6. Customer technology readiness indirectly influences brand admiration through perceived empathy.

The theoretical framework of the study is presented in Figure 1 below.

Figure 1. **Theoretical framework of the study**



Source: Authors' own work

3. Methods

3.1 Research context and sampling

Data were collected from customers of five-star hotels in Egypt through an online questionnaire designed using Google Forms. The sampling frame consisted of actual hotel guests who had recently experienced service interactions in participating five-star hotels, particularly those involving technology-enabled or AI-assisted services. Five-star hotels represent an appropriate research context because they combine high service complexity with advanced digital transformation initiatives, integrating both human service delivery and AI-enabled technologies. These establishments attract diverse customer segments, including technologically experienced and experience-oriented guests, making constructs such as customer technology readiness, perceived empathy, brand admiration, and technological empowerment especially relevant.

The survey link was distributed through the guest relations departments of cooperating hotels. Hotel staff invited eligible guests to participate voluntarily during their stay or immediately after check-

out. Participation was anonymous and voluntary, and no financial incentives were provided. To ensure relevance, inclusion criteria required respondents to (1) have stayed at a five-star hotel in Egypt within the data collection period and (2) have interacted with at least one technology-enabled service during their stay (e.g., mobile check-in, digital concierge systems, smart room features, or AI-assisted services).

A convenience sampling approach was adopted due to access constraints and reliance on hotel cooperation for distribution. While this approach facilitates access to real customers with direct experience of the focal services, it may introduce potential self-selection bias, as guests who are more engaged with digital services or more willing to participate in surveys may be more likely to respond. Nevertheless, the final dataset comprised 442 valid responses after screening for completeness and consistency. This sample size exceeds the recommended minimum requirements for structural equation modeling (Hair et al., 2010) and satisfies contemporary PLS-SEM guidelines (Hair et al., 2021), ensuring adequate statistical power for testing the proposed model, including mediation and moderation effects.

Although convenience sampling was employed primarily due to accessibility and feasibility considerations, its use is also theoretically appropriate for the objectives of this study. The research aims to examine and extend theoretically grounded relationships within the Stimulus–Organism–Response (SOR) framework rather than to estimate population parameters. In predictive and theory-testing research using PLS-SEM, the emphasis is placed on explaining variance and assessing structural relationships among constructs. Therefore, non-probability sampling techniques are considered acceptable when the goal is theory development and model testing rather than statistical generalization.

3.2 Measures

The survey instrument consisted of two sections. The first section contained 29 items measuring the latent constructs of interest (see Appendix A), while the second section collected demographic information, including gender, age, education, frequency of hotel stays, and familiarity with AI-enabled hotel services. To ensure conceptual rigor and content validity, all constructs were assessed using established scales adapted from prior research. All items employed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

- Brand Admiration (BA): Measured with a 5-item scale adapted from Castro-González et al. (2019) and recently applied by Tosun and Tavşan (2024).
- Customer Technology Readiness (CTR): Measured using a 7-item scale adapted from Ma et al. (2022). The CTR scale was adapted to reflect guests' perceived readiness and comfort in using technology-enabled hotel services rather than strictly replicating the original Technology Readiness Index (TRI) sub-dimensions (optimism, innovativeness, discomfort, and insecurity). The adapted items capture functional perceptions of technology usefulness, ease of use, control, and comfort within the hospitality context. This contextual adaptation aligns with prior research that operationalizes technology readiness as an application-specific construct when examined in service environments (Lin & Hsieh, 2006; Kim & Han, 2022; Ma et al., 2022). Although the wording emphasizes usability-related perceptions, these items collectively reflect customers' readiness and positive orientation toward technology-enabled hotel services.
- Perceived Empathy (PE): Assessed through a 9-item scale derived from the Perceived Empathy of Technology Scale developed by Schmidmaier et al. (2024) and applied by Shao et al. (2025).
- Brand Evangelism (BE): Evaluated using a 3-item scale adapted from Mansoor and Paul (2022) and recently applied by Leong et al. (2025).
- Perceived Technological Empowerment (PTE): Assessed with a 5-item scale adapted from Aw et al. (2024).

3.3 Data screening and preparation

A total of 452questionnaires were initially collected through the online survey. After screening for completeness and eligibility, 10 responses were removed due to incomplete answers, failure to meet the inclusion criteria, or inconsistent responses. The final valid sample consisted of 442 usable responses retained for data analysis.

Missing data were minimal. Cases with excessive missing values were excluded from the dataset during the screening process. Because the proportion of missing data was low and did not significantly affect the dataset, listwise deletion was applied to ensure consistency in subsequent analyses.

To ensure data quality, responses were examined for potential response bias. Straight-lining behavior was assessed by inspecting patterns of identical responses across consecutive items. No substantial evidence of systematic straight-lining was detected beyond the excluded incomplete cases. Additionally, response time was reviewed to identify unusually fast completions that might indicate careless responding. Cases with extremely short completion times were inspected and removed when necessary.

These procedures ensured that only complete and high-quality responses were included in the final dataset used for the PLS-SEM analysis.

3.4 Data analysis

Partial Least Squares Structural Equation Modeling (PLS-SEM) was selected as the analytical approach due to its suitability for prediction-oriented research models and complex structural relationships involving mediation and moderation effects. Unlike covariance-based SEM, which focuses primarily on model fit and theory confirmation, PLS-SEM emphasizes variance explanation and predictive accuracy, making it more appropriate for models integrating multiple latent constructs and interaction effects. Given the presence of indirect effects and a moderating relationship in the proposed framework, PLS-SEM provides robust estimation under conditions of model complexity and potential non-normal data distribution (Hair et al., 2021). Furthermore, the use of WarpPLS facilitates the assessment of nonlinear relationships, multicollinearity diagnostics, and advanced model quality indices, thereby enhancing the predictive evaluation of the proposed SOR-based model (Kock, 2021). Therefore, PLS-SEM was deemed more suitable than covariance-based SEM for addressing the study's research objectives.

Common method bias (CMB) concerns were addressed through both procedural and statistical remedies. Procedurally, anonymity was ensured and measurement items were carefully structured to reduce respondent evaluation apprehension. Statistically, Harman's single-factor test was conducted as an initial diagnostic tool following established recommendations (Podsakoff et al., 2003), indicated that no single factor accounted for more than 50% of the variance. In addition, full collinearity variance inflation factors (VIFs) were examined as recommended in PLS-SEM research to detect potential common method bias (Kock & Lynn, 2012; Kock, 2015). All VIF values were below the recommended threshold of 3.3, indicating that common method bias is unlikely to significantly influence the results.

To assess potential non-response bias, an early–late respondent comparison was conducted, following established procedural recommendations. Responses collected during the initial phase of data collection were compared with those obtained in the later phase on key study constructs. Independent sample t-tests indicated no statistically significant differences between early and late respondents. This suggests that non-response bias is unlikely to pose a serious concern in the present study.

4. Results

4.1 Participants' profile

Table 1 summarizes the demographic and behavioral characteristics of the 442 hotel customers surveyed. Slightly more than half of the respondents were male. Most participants were between 20 and 60 years old, with the largest share falling in the 45–60 age range. The majority held an undergraduate degree, and most had stayed in a hotel between one and three times in the past year. Awareness of AI-based hotel services was generally high, with all respondents reporting at least some familiarity and about one-third identifying as frequent or highly familiar users.

Table 1. **Participant's profile (N=442 hotel customers)**

		Frequency	Percent
Gender	Male	236	53.39
	Female	206	46.61
Age	< 20 years	62	14.03
	20:<35 years	160	36.20
	45: 60 years	172	38.91
	>60	48	10.86
Education	High school or below	72	16.29
	Undergraduate degree	260	58.82
	Postgraduate degree or above	110	24.89
Frequency of Hotel Stays (Past 12 Months)	1–3 times	274	61.99
	4–7 times	140	31.67
	8 times or more	28	6.33
Awareness of AI-Based Hotel Services	Very familiar / Frequent user	142	32.13
	Somewhat familiar / Occasional user	300	67.87
	Not familiar	0	0.00

Source: Authors' own work

4.2 Measurement model

All latent constructs in this study were modeled as reflective measurement constructs. The reflective specification was adopted because the measurement items are conceptualized as manifestations of the underlying latent variable rather than independent components that collectively form the construct. The indicators demonstrate high internal consistency and conceptual interchangeability, supporting reflective modeling assumptions. Formative specification was not deemed appropriate because the indicators do not represent distinct dimensions that jointly create the construct, nor do they capture separate causal components. Instead, they reflect shared variance driven by an underlying latent factor, consistent with established measurement modeling guidelines (Hair et al., 2021). Therefore, a reflective measurement approach was theoretically and empirically justified for all constructs in the model. Convergent validity, reliability, and discriminant validity assessments further supported the adequacy of the reflective specification.

Table 2 reports the measurement model's reliability and validity results for all constructs. Each construct shows strong indicator loadings, acceptable VIF values, and satisfactory levels of composite reliability, Cronbach's alpha, and average variance extracted. These results indicate that the items consistently measure their intended constructs and that issues such as multicollinearity are minimal, supporting the overall quality of the psychometric properties.

Although a few indicator loadings were below the commonly recommended threshold of 0.70, all retained items below this threshold were statistically significant. According to Hair et al. (2021, pp.

77), in reflective measurement models, indicators with loadings between 0.40 and 0.70 should only be considered for removal if deleting them substantially improves composite reliability (CR) or average variance extracted (AVE). In the current study, all constructs demonstrate CR > 0.70 and AVE > 0.50, and removing these lower-loading indicators would not meaningfully enhance reliability or convergent validity. Furthermore, these indicators are theoretically relevant and important for fully capturing the conceptual domains of the constructs. Therefore, following Hair et al.'s guidance, these items were retained to preserve both content validity and the integrity of the measurement model.

Table 2. **Results of psychometric properties**

Construct	Indicators	Loading	CR	CA	AVE	VIF
Customer Technology Readiness (CTR)	CTR1	(0.835)	0.905	0.877	0.579	2.308
	CTR2	(0.747)				
	CTR3	(0.798)				
	CTR4	(0.714)				
	CTR5	(0.802)				
	CTR6	(0.780)				
	CTR7	(0.634)				
Perceived empathy (PE)	PE1	(0.594)	0.937	0.922	0.626	3.474
	PE2	(0.777)				
	PE3	(0.920)				
	PE4	(0.769)				
	PE5	(0.823)				
	PE6	(0.648)				
	PE7	(0.702)				
	PE8	(0.903)				
	PE9	(0.913)				
Brand Admiration (BA)	BA1	(0.900)	0.905	0.867	0.659	3.174
	BA2	(0.837)				
	BA3	(0.671)				
	BA4	(0.899)				
	BA5	(0.723)				
Brand evangelism (BE)	BE.1	(0.689)	0.834	0.700	0.628	2.406
	BE.2	(0.846)				
	BE.3	(0.833)				
Perceived Technological Empowerment (PTE)	PTE.1	(0.848)	0.896	0.853	0.634	1.865
	PTE.2	(0.858)				
	PTE.3	(0.796)				
	PTE.4	(0.800)				
	PTE.5	(0.664)				

Source: Authors' own work

Table 3 presents the discriminant validity, which was evaluated using the Fornell–Larcker criterion and inter-construct correlation comparison (Fornell & Larcker, 1981), in line with established PLS-SEM guidelines (Hair et al., 2021), where the square root of the AVE for each construct exceeds its correlations with other constructs. Each diagonal value exceeds the corresponding correlations with other constructs, demonstrating adequate discriminant validity. The inter-construct correlations range from modest to strong, indicating that while the variables are related, they remain conceptually distinct.

Table 3. **Correlations among latent variables with the square root of AVEs**

Construct	CTR	PE	BA	BE	PTE
Customer Technology Readiness (CTR)	0.761				
Perceived empathy (PE)	0.575	0.791			
Brand Admiration (BA)	0.589	0.599	0.812		
Brand evangelism (BE)	0.718	0.548	0.611	0.792	
Perceived Technological Empowerment (PTE)	0.468	0.608	0.506	0.497	0.796

Source: Authors' own work

Table 4 reports the HTMT ratios used to assess discriminant validity among the constructs. All HTMT values fall below recommended thresholds, indicating that the constructs are sufficiently distinct from one another. This supports the conclusion that each variable captures a unique aspect of the model.

Table 4. **Discriminant validity (HTMT)**

Construct	CTR	PE	BA	BE	PTE
Customer Technology Readiness (CTR)					
Perceived empathy (PE)	0.652				
Brand Admiration (BA)	0.694	0.738			
Brand evangelism (BE)	0.630	0.714	0.807		
Perceived Technological Empowerment (PTE)	0.563	0.707	0.627	0.668	

Source: Authors' own work

4.3 Model fit

The overall quality and predictive performance of the structural model were further evaluated using comprehensive model fit and quality indices implemented in WarpPLS (Kock, 2021). These indices (see Appendix B) include the Average Path Coefficient (APC), Average R-Squared (ARS), Average Adjusted R-Squared (AARS), Average Block Variance Inflation Factor (AVIF), Average Full Collinearity VIF (AFVIF), Tenenhaus Goodness-of-Fit (GoF), and additional diagnostic ratios such as the Sympson's Paradox Ratio (SPR), R-Squared Contribution Ratio (RSCR), Statistical Suppression Ratio (SSR), and Nonlinear Bivariate Causality Direction Ratio (NLBCDR). Collectively, these criteria assess model explanatory power, multicollinearity, suppression effects, predictive relevance, and overall model robustness in accordance with established PLS-SEM evaluation guidelines.

4.4 Structural model and hypotheses testing

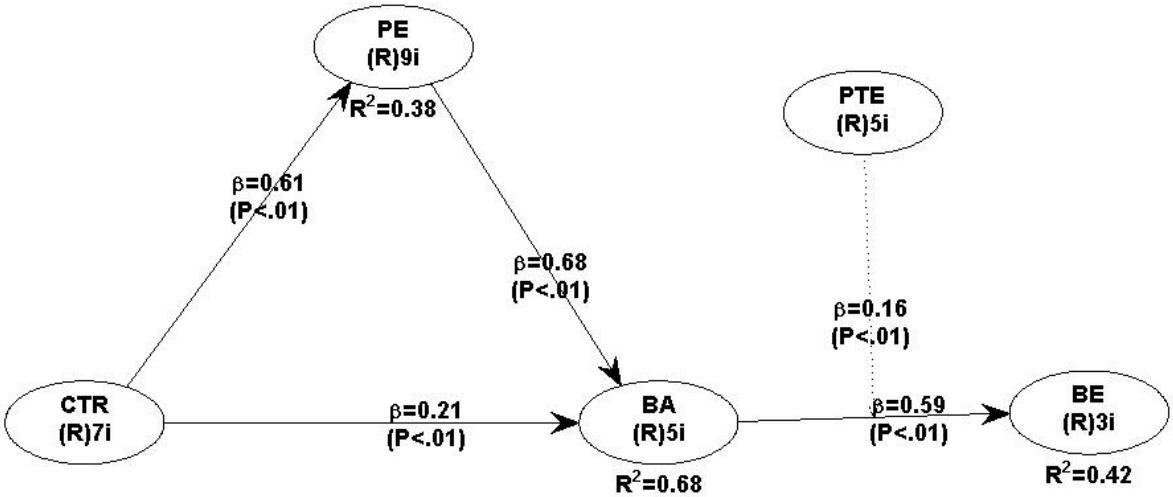
Table 5, Figure (2), and Figure (3) summarizes the direct and moderating effects in the structural model, including path coefficients, significance levels, effect sizes, and hypothesis outcomes. The results show that customer technology readiness (CTR) has a significant positive influence on brand admiration (BA) with a moderate effect size ($\beta = 0.21$, $f^2 = 0.131$, $p < 0.01$), indicating that customers who are more comfortable with technology are more likely to admire the hotel brand. CTR also strongly predicts perceived empathy (PE) with a larger effect size ($\beta = 0.61$, $f^2 = 0.377$, $p < 0.01$), suggesting that technology-ready customers are better able to recognize empathic behavior in service encounters, whether human or AI-assisted.

Perceived empathy, in turn, has a very strong positive effect on brand admiration (β = 0.68, f^2 = 0.550, p < 0.01), highlighting that customers who perceive higher empathy tend to develop greater admiration for the brand. Brand admiration then significantly influences brand evangelism (BE) with a large effect size (β = 0.59, f^2 = 0.368, p < 0.01), indicating that highly admiring customers are more likely to promote the brand actively.

The moderating effect of perceived technological empowerment (PTE) is also significant (β = 0.16, f^2 = 0.050, p < 0.01), demonstrating that the relationship between brand admiration and brand evangelism is strengthened when customers feel empowered by the hotel's technological offerings. Although this moderation has a modest effect size, it indicates that technology empowerment amplifies the positive impact of admiration on advocacy behaviors.

The explained variance (R^2) values indicate the predictive strength of the model. CTR explains 38% of the variance in perceived empathy, while CTR and PE together account for 68% of the variance in brand admiration. Brand admiration and its interaction with PTE explain 42% of the variance in brand evangelism, suggesting the model has substantial explanatory power, particularly for predicting brand admiration. Overall, the table confirms that all proposed hypotheses are supported and underscores the important roles of technology readiness, perceived empathy, and technological empowerment in driving brand admiration and customer advocacy.

Figure 2. **Final results of the study**



Source: Authors' own work

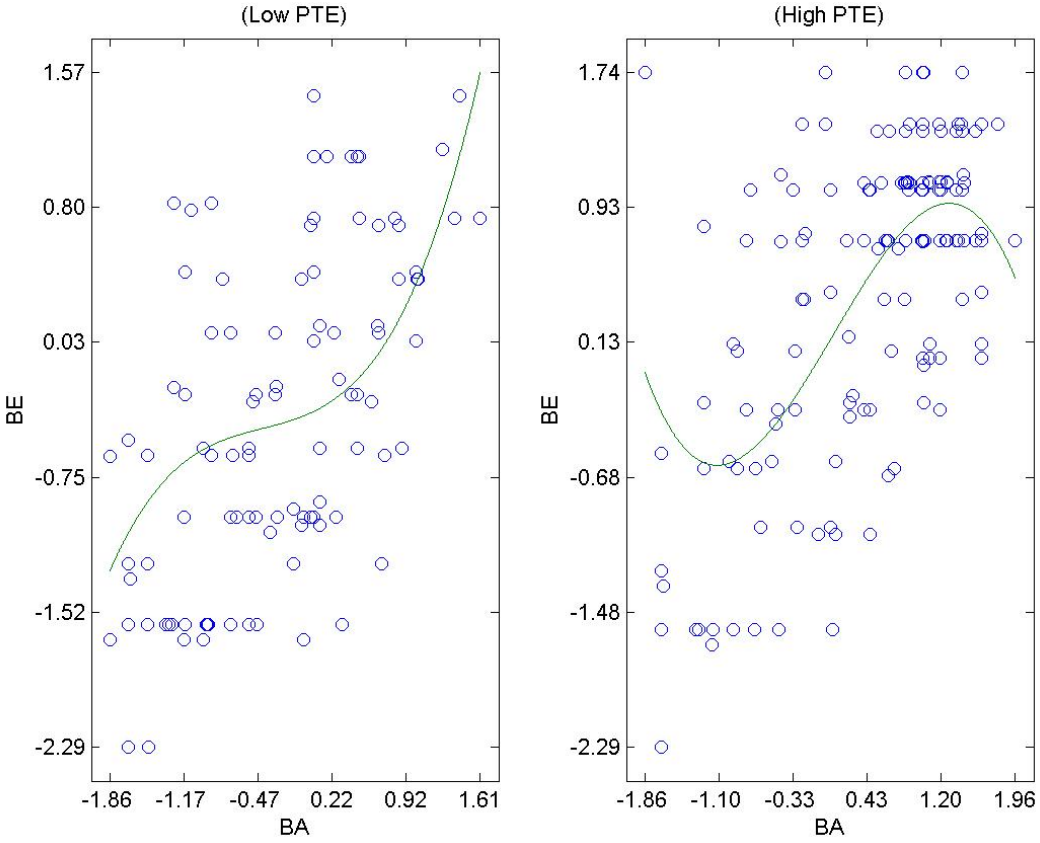
Table 5. **Direct and moderation effects**

H	Structural Paths	Path Coefficient (β)	SE	t-value	*P*-values	95% CIs	Effect Size (f^2)	Result
Direct Effect								
H1	CTR →BA	0.21	0.046	4.582	<0.01	{0.121-0.303}	0.131	Supported
H2	CTR → PE	0.61	0.044	13.980	<0.01	{0.528-0.700}	0.377	Supported
H3	PE → BA	0.68	0.044	15.651	<0.01	{0.596-0.767}	0.550	Supported

H4	BA →BE	0.59	0.044	13.323	<0.01	{0.501-0.674}	0.368	Supported
Moderating Effect								
H5	BA* PTE → BE	0.16	0.047	3.531	<0.01	{0.073-0.256}	0.050	Supported
PE $R^{2:}$ = 0.38, BA $R^{2:}$ = 0.68, BE $R^{2:}$ = 0.42								

Source: Authors' own work

Figure 3. **Simple slopes plot (low/high moderator) of PTE**



Source: Authors' own work

Table 6 presents the mediation analysis of perceived empathy (PE) in the relationship between customer technology readiness (CTR) and brand admiration (BA), using the bootstrapping method proposed by Preacher and Hayes (2008). The table reports the path coefficients for the a-path (CTR → PE) and b-path (PE → BA), the indirect effect, standard error, t-value, and the 95% bootstrapped confidence interval.

The results indicate that CTR has a strong positive effect on PE (path a = 0.610), and PE, in turn, has a significant positive effect on BA (path b = 0.680). The calculated indirect effect of CTR on BA through PE is 0.415, with a standard error of 0.032 and a very high t-value of 12.963, demonstrating strong statistical significance. The 95% bootstrapped confidence interval ranges from 0.352 to 0.478, not crossing zero, which confirms that the mediation effect is statistically significant.

These results support Hypothesis 6, indicating that perceived empathy partially mediates the relationship between customer technology readiness and brand admiration. In practical terms, this suggests that technology-ready customers are more likely to admire the brand because their readiness

enhances their perception of empathy in service interactions. The mediation highlights the pivotal role of perceived empathy as a mechanism through which technological readiness translates into stronger brand admiration.

Table 6. **Mediation analysis' Bootstrapped Confidence Interval**

Hypo.		Path a	Path b	Indirect Effect	SE	t-value	Direct Effect	Total effect	Bootstrapped Confidence Interval		VAF (%)	Mediation
									95% LL	95% UL		
H6	CTR→PE →BA	0.610	0.680	0.415	0.032	12.963	0.21	0.625	0.352	0.478	66.4	Partial

Source: Authors' own work

5. Discussion

This study employed the Stimulus–Organism–Response (SOR) framework to examine how hotel customers' technology-related traits and perceptions influence their attitudes and behaviors toward hotel brands in Egypt. The findings offer both theoretical and practical insights into the mechanisms through which technology readiness, perceived empathy, and perceived technological empowerment affect brand-related outcomes.

The results reveal that customer technology readiness (CTR) exerts a significant positive influence on brand admiration (BA) (β=0.21, p<0.01, f^2=0.131). This finding supports the premise that customers who are confident and comfortable with technology are more likely to appreciate and value technologically advanced hotel services. Within the SOR framework, CTR functions as a stimulus that enhances the organismic state, manifested here as positive evaluations of the hotel brand. These results align with prior research in smart hotel contexts, which has demonstrated that technology readiness significantly shapes favorable attitudes and behavioral intentions toward technology-enabled hotel services (Kim & Han, 2022). Han et al. (2024) further suggest that technology readiness, in combination with motivational and emotional factors, guides guests' selection of smart hotel offerings. In essence, technology readiness facilitates guests' acceptance of and positive attitudes toward advanced technological features, supporting the notion that technologically competent customers perceive hotel technologies as usable, beneficial, and convenient, thereby enhancing brand admiration.

Additionally, the findings indicate that CTR positively influences perceived empathy (PE) (β=0.61, p<0.01, f^2=0.377), suggesting that technologically ready customers are more adept at recognizing empathic cues in service encounters, whether delivered by staff or through digital/AI-enabled systems. This extends the SOR framework by demonstrating that customer traits affect not only cognitive evaluations of a brand but also affective responses such as empathy. The combination of internal traits, such as technology readiness, with emotional and anticipatory factors in shaping guest responses is consistent with recent research showing that technology readiness and emotional dimensions jointly influence guest preferences for smart hotel products (Han et al., 2024). Moreover, these results corroborate Yoon and Lee (2021), who found in the context of digital service encounters in hospitality that user readiness positively moderates perceived empathy and satisfaction, as technologically capable users can leverage services to meet their needs, resulting in more positive emotional responses.

Consistent with expectations, PE significantly predicts BA (β=0.68, p<0.01, f^2=0.550): customers who perceive themselves as understood and valued by the hotel are more likely to develop positive

attitudes toward the brand. This underscores the critical role of affective responses in shaping brand evaluations, aligning with hospitality research identifying empathy—as a component of perceived service quality—as a key determinant of loyalty and favorable brand attitudes (Özcan et al., 2024). Furthermore, mediation analysis indicates that CTR indirectly influences BA via PE (Indirect Effect=0.415, SE=0.032, t=12.963, 95% CI [0.352, 0.478]), highlighting that perceived empathy partially explains how technology readiness translates into enhanced brand admiration. In other words, technologically ready customers admire the brand not solely due to its technological features but also because these features facilitate empathic and personalized experiences.

The findings further demonstrate that BA positively influences brand evangelism (BE) (β=0.59, $p<0.01$, f^2=0.368), indicating that customers who hold the brand in high regard are more likely to engage in advocacy behaviors, such as recommending the hotel or promoting it on social media. This observation is consistent with the SOR framework, wherein positive organismic states (e.g., admiration) lead to favorable behavioral responses (evangelism). Prior hospitality research similarly suggests that when customers perceive high service quality—including emotional dimensions like empathy—they are more inclined to exhibit loyalty and brand-supportive behaviors (Aly, 2025). These results highlight the importance of fostering emotional attachment and admiration as a pathway to encouraging voluntary customer promotion of the brand.

Importantly, perceived technological empowerment (PTE) moderates the relationship between BA and BE (β=0.16, $p<0.01$, f^2=0.050), such that the effect is stronger when PTE is high. This indicates that customers who feel empowered by the hotel's technological tools—able to navigate services efficiently, customize experiences, or access information independently—are more likely to translate admiration into active evangelistic behaviors. The moderating role of PTE underscores the significance of enabling customers to engage with technology in ways that enhance autonomy and confidence, thereby reinforcing the link between positive attitudes and advocacy behaviors. Analogous research in digital service contexts has found that empowerment strengthens brand-related commitment and loyalty when technology facilitates customer control and autonomy (Kim et al., 2020).

Collectively, these findings suggest that in hotel environments, technology readiness and empowerment extend beyond functional usage—they shape the emotional and attitudinal foundations that drive brand admiration and evangelism. Consequently, hotels should consider technology not merely as a functional enabler but as a strategic instrument to cultivate deeper brand relationships through empathy, admiration, and customer-driven advocacy.

6. Theoretical implications

This study advances theory by addressing a key gap concerning how customer technology readiness translates into emotional attachment and brand advocacy in technology-enabled hospitality settings. While prior research has largely linked technology readiness to adoption and behavioral intention, its emotional and advocacy-related consequences have been underexplored. By integrating customer technology readiness into the Stimulus–Organism–Response (SOR) framework (Mehrabian & Russell, 1974), the study extends traditional technology adoption research toward a more holistic understanding of affective and behavioral responses in smart hospitality contexts. *First*, the findings demonstrate that technology readiness acts as a stimulus influencing internal psychological states, such as perceived empathy and brand admiration. This emphasizes that technology-related customer traits shape not only usage behaviors but also emotional evaluations of service experiences. The study thereby contributes to the literature on technology-mediated emotional experiences in hospitality. *Second*, the mediating role of perceived empathy highlights its central function as an organismic mechanism translating technological stimuli into brand admiration. This finding reinforces theoretical perspectives that empathy, even when delivered through intelligent systems and personalized interfaces, strengthens

emotional attachment and positive brand evaluation. It provides empirical support for the concept of artificial empathy in technology-mediated services. *Third*, the link between brand admiration and brand evangelism extends brand theory in hospitality by demonstrating that emotionally grounded brand attitudes foster proactive advocacy behaviors, beyond traditional satisfaction or loyalty metrics. This underscores the importance of incorporating affective constructs in models of customer-driven brand promotion. *Fourth*, the moderating effect of perceived technological empowerment introduces a boundary condition that clarifies when emotional attachment translates into behavioral advocacy. Empowered customers, who feel autonomous and competent in using hotel technologies, are more likely to act on positive brand emotions. This insight advances SOR theory by demonstrating that individual perceptions of control and empowerment shape whether affective responses result in observable behaviors. *Finally*, by examining five-star hotels in an emerging market context, the study provides context-specific theoretical insights. Luxury hotels represent environments where service quality, technology, and emotional engagement intersect, offering a unique setting to test technology–emotion–advocacy pathways. These findings enhance the generalizability of SOR-based models and inform future research in technology-intensive, high-service hospitality segments.

7. Practical implications

The findings of this study provide actionable guidance for hotel managers and marketers to strengthen brand evangelism in technology-enabled hospitality environments by strategically leveraging technology, empathy, and empowerment.

7.1 Strategic implications

The results indicate that customer technology readiness significantly influences both perceived empathy and brand admiration. This suggests that hotels should invest in intuitive, user-friendly digital infrastructures that accommodate varying levels of technological competence. Simplifying digital interfaces, ensuring seamless integration across service touchpoints, and designing AI-enabled systems that are responsive can enhance customers' comfort with technology, strengthening their emotional connection and positive brand attitudes.

The moderating role of perceived technological empowerment shows that when customers feel in control and competent using hotel technologies, brand admiration is more likely to translate into brand evangelism. Therefore, hotel strategies should focus on empowering guests to customize their experiences, access information independently, and manage services digitally, amplifying the impact of positive brand emotions on advocacy behaviors.

7.2 Operational implications

The mediating effect of perceived empathy highlights the importance of delivering empathetic experiences through both human and technology-mediated interactions. Hotels should integrate AI-driven personalization—such as tailored room settings, customized recommendations, and timely digital communication—with empathetic human service. Training frontline employees to complement digital systems ensures that technology enhances rather than replaces emotional engagement.

To foster brand evangelism, hotels should implement engagement-oriented programs that encourage customers to share positive experiences, including loyalty initiatives, referral incentives, and social media campaigns. Guests who are technologically empowered and emotionally connected are more likely to act on their admiration, actively promoting the brand.

7.3 Context-specific implications

In the context of five-star hotels, where service expectations are high and digital experiences are intensive, managers should emphasize how technology enhances both convenience and personalized care. By balancing technological innovation with empathetic service delivery, hotels can increase emotional attachment, elevate brand admiration, and convert satisfied guests into proactive brand evangelists.

Overall, the study demonstrates that operationalizing customer technology readiness, delivering empathetic experiences, and empowering guests to control their interactions are key levers for transforming positive customer emotions into active advocacy behaviors, ensuring that digital transformation supports both efficiency and strong brand engagement.

8. Limitations and future research

While this study provides valuable theoretical and practical insights, certain limitations should be acknowledged, offering directions for future research. First, the research was conducted within the hotel industry in Egypt, which may limit the generalizability of the findings to other cultural, geographic, or industry contexts. Customer behavior and technology adoption patterns can differ significantly across countries and service sectors. Future studies could replicate the proposed model in diverse hospitality markets or in other service industries, such as retail, healthcare, or transportation, to assess the robustness and cross-cultural applicability of the observed relationships.

Second, the study employed a cross-sectional survey design, capturing customer perceptions and behaviors at a single point in time. While the results indicate associations among variables, causal inferences should be interpreted with caution. Future research could adopt longitudinal or experimental designs to better examine causal relationships, such as tracking how changes in technology readiness or perceived technological empowerment influence brand admiration and evangelism over time.

Third, all data were collected through self-reported questionnaires, which may introduce biases such as social desirability or common method variance. Although statistical checks were implemented to mitigate these effects, future studies could incorporate objective behavioral measures, such as actual usage logs of AI services or tracking customer advocacy behaviors on social media, to complement self-reported data.

Fourth, the study examined perceived empathy as a mediator and perceived technological empowerment as a moderator; however, other psychological or situational factors may also influence the observed relationships. Variables such as trust in AI, perceived service quality, customer engagement, or personality traits could provide additional explanatory power. Future research could explore multiple mediators and moderators simultaneously to capture more complex mechanisms underlying the effects of technology on brand outcomes.

Fifth, the model primarily addresses customers who are already comfortable with technology. Some customer segments may be less tech-savvy or resistant to AI-enabled services. Future studies could investigate how lower levels of technology readiness influence perceptions, emotional responses, and behavioral outcomes, potentially identifying strategies to effectively engage these customers. In addition, respondents' income levels were not collected in the present study, future research may consider incorporating income as a control variable to provide deeper insights into socio-economic differences in technology readiness and brand evangelism.

Finally, this study focused on current AI-based hotel services. As technology continues to evolve rapidly, future research could examine emerging innovations, such as augmented reality experiences, virtual concierge systems, or blockchain-based service platforms, to understand how novel technological stimuli shape customer attitudes and behaviors.

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Appendix A.

Appendix (A) measurement scales		
Perceived Empathy (PE)	PE1	The hotel's AI-enabled services appeared to consider my emotional state during interactions.
	PE2	The AI service showed emotional intelligence in understanding how I felt.
	PE3	The AI service communicated in a way that felt attentive and emotionally aware.
	PE4	The AI system expressed supportive responses when I encountered difficulties.
	PE5	The AI service demonstrated genuine interest in my preferences and needs.
	PE6	The AI service helped me manage emotionally challenging or stressful situations during my stay.
	PE7	The AI system seemed to understand my goals and expectations as a hotel guest.
	PE8	The AI service recognized and responded to my individual needs.
	PE9	The AI system accurately interpreted my intentions during interactions.
Brand Evangelism (BE)	BE1	I have encouraged several of my friends to try this hotel brand.
	BE2	I try to convince as many people as possible to choose this hotel brand.
	BE3	I feel the need to tell others that this hotel brand is exceptionally appealing.
Perceived Technology Empowerment (PTE)	PTE1	When using the hotel's AI services, I feel in control of my stay.
	PTE2	Having the ability to influence hotel services through AI technology is beneficial to me.
	PTE3	I feel good because AI technology allows me to personalize my room, services, or amenities.
	PTE4	AI technology enables me to freely select hotel services and amenities during my stay.
	PTE5	Compared to past experiences, AI technology gives me more influence over my hotel stay.
Customer Technology Readiness (CTR)	CTR1	Based on my experience with the hotel's technologies, I believe they contribute to a better quality of my stay.
	CTR2	The hotel's technologies make my stay feel more convenient and give me greater freedom.
	CTR3	The hotel's technologies give me more control over different aspects of my stay.
	CTR4	Using the hotel's technologies makes me feel more productive and efficient during my trip.
	CTR5	I find the hotel's technologies easy to understand and use.
	CTR6	I believe that the hotel's technologies can be used easily by most guests.

	CTR7	I feel comfortable using the hotel's technologies and do not experience discomfort when interacting with them.
Brand Admiration (BA)	BA1	I feel admiration when I think about this hotel brand.
	BA2	I feel respect for this hotel brand.
	BA3	I feel inspired by this hotel brand.
	BA4	This hotel brand impresses and amazes me.
	BA5	This hotel brand inspires positive feelings in me.

Appendix B.

Appendix (B): Model fit and quality indices			
	Assessment	Criterion	Mark
Average path coefficient (APC)	0.452, P<0.001	P<0.05	√
Average R-squared (ARS)	0.492, P<0.001	P<0.05	√
Average adjusted R-squared (AARS)	0.490, P<0.001	P<0.05	√
Average block VIF (AVIF)	1.299	acceptable if ≤ 5, ideally ≤ 3.3	√
Average full collinearity VIF (AFVIF)	2.393	acceptable if ≤ 5, ideally ≤ 3.3	√
Tenenhaus GoF (GoF)	0.581	small ≥ 0.1, medium ≥ 0.25, large ≥ 0.36	√
Sympson's paradox ratio (SPR)	1.000	acceptable if ≥ 0.7, ideally = 1	√
R-squared contribution ratio (RSCR)	1.000	acceptable if ≥ 0.9, ideally = 1	√
Statistical suppression ratio (SSR)	1.000	acceptable if ≥ 0.7	√
Nonlinear bivariate causality direction ratio (NLBCDR)	1.000	acceptable if ≥ 0.7	√