SMART HOSPITALITY: THE ROLE OF AI IN ENHANCING SUSTAINABLE GUEST EXPERIENCES

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Abstract

Emerging demands for sustainability and personalized service are fundamentally transforming the hospitality industry, with AI-driven technologies reconfiguring operational structures and advancing guest engagement methodologies. This study`s objective is to investigate the role of AI in enhancing comfort and promoting environmentally responsible practices within the hospitality sector. Based on data gathered from 150 respondents in Bucharest (Romania), the research explores how guest satisfaction, sustainability awareness, and perceived concerns shape attitudes toward AI-enabled hotels. Results show that guests who have experienced AI technologies report significantly higher levels of comfort and satisfaction. Additionally, eco-conscious travelers are more likely to prefer and be attracted to hotels that use AI for sustainable purposes, particularly when such technologies also enable personalized services. Although concerns about data privacy and reduced human interaction were widespread, their influence could not be quantitatively assessed due to sample limitations. The findings highlight AI's potential to boost efficiency and sustainability but also stress the importance of transparency and human-centric design to mitigate adoption barriers

Keywords: Artificial Intelligence (AI), smart hospitality, sustainability, guest experience, eco-conscious travelers, hotel technology adoption

JEL Classification: L83, Q01, O33

1. Introduction

The hospitality industry is undergoing a significant transformation with the integration of smart technologies and artificial intelligence (AI) in all operational facets. As travelers increasingly seek personalized and sustainable experiences, hotels are adopting AI-driven solutions to enhance guest satisfaction while reducing their environmental impact. From automated check-in processes and smart room controls to AI-powered energy management systems, these innovations are reshaping the way guests interact with hospitality services.

This study explores the role of AI in modern hospitality, with a particular focus on its impact on guest experiences and sustainability. Our research is based on survey data collected from individuals who have stayed in hotels utilizing AI-driven technologies. The findings

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provide insight into the extent of AI adoption in the hospitality sector, guest perceptions of AI-enhanced services, and the role of AI in promoting eco-friendly practices.

A key component of smart hospitality is its ability to optimize resource consumption. AI-powered thermostats, automated lighting systems, and smart water management solutions help hotels minimize waste while maintaining a high standard of comfort for guests. The survey results indicate that travelers are increasingly aware of AI's potential to contribute to sustainability, with many expressing a preference for hotels that implement green AI technologies. However, the adoption of AI in hospitality is not without challenges. While AI-driven automation can improve efficiency and enhance guest experiences, concerns such as data security, lack of human interaction, and usability issues remain prevalent among travelers. This study aims to address these concerns and provide a comprehensive analysis of how AI can be leveraged to create smarter, more sustainable hospitality experiences.

2. Literature review

Concept of sustainability in hospitality

Sustainability in the hospitality industry involves integrating eco-friendly and socially responsible practices into all aspects of operations, aiming to minimize environmental impact while enhancing economic and social benefits. This encompasses reducing waste, conserving energy and water, sourcing local and organic products, and adopting responsible tourism practices [1,2]. Implementing such measures can lead to reduced operational costs, improved brand reputation, and increased guest loyalty. Since the consumer demand for environmentally responsible accommodation has been on the rise, booking platforms specializing in green hotels have emerged. This shift has prompted many establishments to adopt green certifications, such as the Green Key or Green Globe eco-labels, to attract eco-conscious guests and differentiate themselves in a competitive market.

Smart hotels, also known as smart building systems [3], which leverage advanced technologies to enhance guest experience and operational efficiency, play a growing role in promoting sustainability. From automated energy management systems to digital check-ins and smart room controls, these innovations help reduce resource consumption and streamline service delivery. Overall, smart hotels can reduce operating costs by up to 40% compared to traditional hotels, thanks to their optimized use of space, efficient processes, and advanced technologies [4]. Moreover, guest satisfaction and loyalty in smart hotels are significantly influenced by guests' motivation and ability to use technology, highlighting the need for hotels to align technological features with user competencies while considering both internal and external factors for long-term success [5]. Smart hotels must tailor technology integration to diverse guest preferences, balancing innovation with human touch [6].

Artificial Intelligence in hospitality

Artificial Intelligence has become a transformative force in the hospitality industry, streamlining operations and enhancing guest experiences. AI-powered tools are utilized for various applications, including virtual assistants, real-time translation services, and dynamic pricing strategies. These technologies automate repetitive tasks, allowing staff to focus on personalized guest interactions. Tussyadiah (2020) explored the effects of AI-driven smart hotel technologies, including voice-activated room controls and facial recognition for streamlined check-ins. The findings indicated that while these innovations enhanced convenience and operational efficiency, they also sparked concerns regarding data privacy and ethical issues. The same concerns are present in a study conducted by Du et al. (2024), highlighting that consumers are more likely to adopt technology if they see others using and endorsing it. Sarude (2025) and M'hamed (2024) highlight in their studies that the integration of AI in the hospitality industry brings substantial advantages, such as personalized guest experiences, enhanced operational efficiency, and improved decision-making. However, both studies underscore that to fully realize these benefits, businesses must balance technological innovation with ethical considerations and a continued focus on human-centered service.

Author Gajic et al. (2024) affirms that the implementation of AI and IoT technologies offers hotel managers practical opportunities to reduce costs, and promote sustainability, ultimately leading to long-term economic and ecological benefits without compromising guest experience. In terms of personalization, AI enables hotels to analyze vast amounts of data to predict guest preferences, tailor recommendations, and manage in-house services more effectively. This leads to superior guest experience and increases operational productivity. Additionally, AI-driven energy management systems can monitor and control energy usage, contributing to sustainability efforts by optimizing resource consumption.

Smart Hospitality and Sustainable Experiences

The concept of smart hospitality involves the integration of advanced technologies, such as Artificial Intelligence (AI) and the Internet of Things (IoT), to develop intelligent, responsive hotel environments and enhance management efficiency [7]. Smart hotels leverage automated systems for functions like energy management, smart lighting, and climate control, thereby enhancing guest comfort while simultaneously reducing environmental impact [8]**.** For example, AI-driven algorithms can optimize housekeeping operations by analyzing guest check-in and check-out patterns, promoting efficient resource allocation. According to King (2024), AI serves as a strategic enabler of sustainability in the hospitality sector, allowing hotels to reduce their ecological footprint through intelligent resource management and environmentally conscious practices, while also strengthening their competitiveness and long-term viability.

By implementing AI-driven solutions, hotels can offer personalized services that cater to individual guest preferences, such as customized room settings and tailored recommendations [9]. Simultaneously, these technologies contribute to sustainability by

minimizing waste and conserving energy, thereby reducing the hotel's overall carbon footprint. Chang (2024) identifies key barriers to the adoption of eco-friendly technologies in the hospitality sector, such as high implementation costs, limited staff expertise, and a perceived lack of adequate return on investment, obstacles that are similarly applicable to the adoption of AI technologies.

Enhancing Sustainable Guest Experiences through AIS

In the hospitality industry sustainability has become a critical focus, with AI playing a significant role in promoting eco-friendly practices. AI technologies facilitate energy management systems that optimize resource consumption, thereby reducing the environmental footprint of hotel operations. Arana-Landín et al. (2024) emphasize that AI and IoT technologies play a key role in promoting environmental sustainability in hospitality by optimizing energy consumption—particularly through predictive management of HVAC systems—thus reducing resource use while maintaining guest comfort.

Moreover, the ability to personalize services ensures that sustainability initiatives are seamlessly integrated into the guest experience without compromising comfort or convenience. Also, AI tools enable the collection and analysis of guest feedback on sustainability efforts, allowing hotels to continuously improve and align their initiatives with guest expectations. In a study by Çeltek (2023), it was found that smart hotels use AI and recognition technologies to personalize services, with over 75% of hotels applying these tools at key customer touchpoints like check-in and room customization.

This study addresses a gap in existing research by empirically examining how AI technologies influence guest satisfaction and sustainability preferences in the context of real-life hospitality experiences. While previous literature has largely focused on the theoretical advantages of AI and its technical implementation, there remains limited empirical evidence connecting AI-driven hotel services with specific guest behaviors and perceptions. By grounding its insights in primary data from a tech-savvy urban sample, this study advances the understanding of how smart hospitality can meet the dual demands of personalization and sustainability in a post-pandemic travel landscape.

Built on Self-Determination Theory (SDT) [10] and Green Information Systems (Green IS) [11], this study examines how AI technologies in hotels address psychological needs (autonomy, competence) while advancing sustainability goals. SDT posits that technology fulfilling intrinsic needs enhances satisfaction, while Green IS argues for AI's dual role in operational efficiency and environmental stewardship. Empirical studies corroborate these frameworks: AI-driven personalization improves guest experiences [12], and energy-saving AI systems reduce hotel carbon footprints [13].

Based on these results of previous studies, the following hypotheses are proposed:

H1: Guests who have experienced AI technologies in hotels report higher levels of satisfaction and comfort compared to those who have not. Guests exposed to AI technologies (e.g., smart check-in, voice-controlled amenities) will report higher satisfaction (H1), as these tools fulfill SDT's autonomy and competence needs [10]. Prior research shows that self-service technologies enhance perceived control [14], supporting this hypothesis.

H2: Eco-conscious travelers are more likely to prefer hotels that use AI-driven sustainability measures (e.g., smart energy management) and perceive such hotels as more attractive. Melville's (2010) Green IS framework suggests that sustainability-signaling technologies attract eco-conscious consumers. H2 extends this by proposing that travelers who prioritize environmental responsibility will prefer hotels using AI for sustainability (e.g., smart energy systems). Wiederhold and Martinez (2018) empirically validated this, showing AI reduced hotel energy use by 22%.

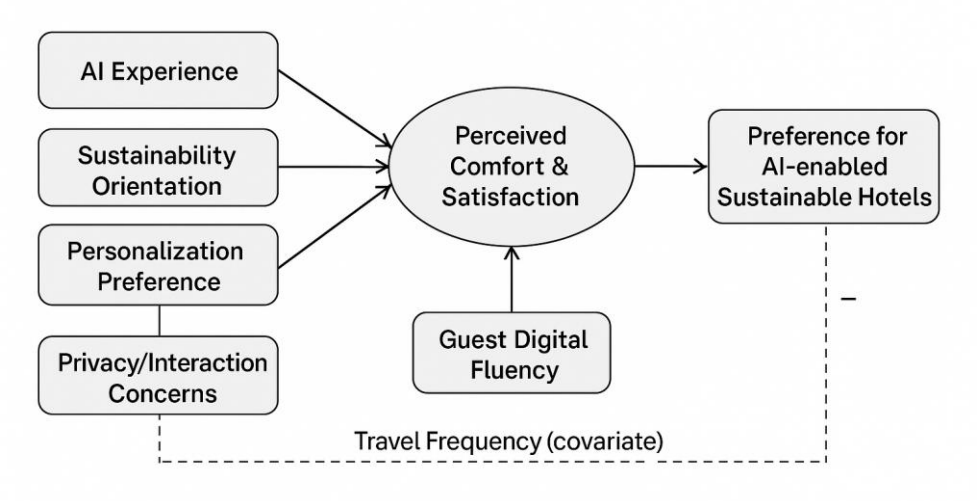

Figure 1. Conceptual framework: the role of AI in enhancing sustainable guest experience

H3: Guests who value sustainability measures are more likely to prefer hotels that integrate AI for both personalization and environmental impact reduction. Elliot's (2016) hybrid-value model demonstrates consumer preference for technologies blending convenience and sustainability. H3 hypothesizes that guests will favor hotels integrating AI for both personalized services (e.g., adaptive room settings) and environmental benefits (e.g., waste reduction), a synergy observed in smart hospitality [15].

H4: Concerns related to data privacy, lack of human interaction, or complexity of use negatively influence guests' willingness to stay in AI-enabled hotels. Despite benefits, Technology Acceptance Model (TAM; Davis, 1989) highlights adoption barriers. H4

predicts privacy concerns and human interaction deficits will reduce AI-hotel willingness, while H5 posits age as a moderator [16], given younger travelers' higher digital literacy.

Figure 1 illustrates our theoretical framework, integrating Self-Determination Theory (Ryan & Deci, 2000) and Green IS (Melville, 2010) to explain AI's dual role in hospitality.

3. Data Analysis

This research employed a quantitative approach through a questionnaire-based survey conducted in Bucharest, Romania, between February and March 2025. Bucharest was selected as the research setting due to its status as Romania's most urbanized and technologically developed city, hosting a diverse population of digitally literate travelers and a growing number of smart hospitality providers. Its robust tourism infrastructure and early adoption of AI-based hotel solutions made it an appropriate environment for examining guest perceptions of technology - enhanced experiences. However, it is important to note that the sample was obtained through a non-probability sampling method, relying on voluntary responses from individuals who had stayed in hotels within the past year. As such, the findings may not be generalizable to the broader population of travelers, particularly those from rural areas or less technologically integrated environments.

The survey aimed to capture traveler perceptions of AI-enhanced hospitality services, particularly focusing on satisfaction, sustainability awareness, and technology-related concerns. The questionnaire included items measuring experiences with smart technologies in hotels, attitudes toward sustainability, perceived comfort, and openness to AI-driven personalization.

3.1 Data screening and methodological approach

The dataset underwent a rigorous screening process to ensure analytical accuracy and methodological integrity. Missing data were minimal (<2%) and addressed using pairwise deletion, a conservative technique that preserves statistical power while minimizing bias [17]. The Shapiro-Wilk test ($p < 0.05$) indicated non-normal distributions for all Likert-scale variables, necessitating the use of non-parametric statistical methods [18].

3.2 Descriptive statistics

A total of 150 valid responses were analyzed. The demographic profile of the sample is summarized in Table 1. The majority of respondents (56%) were aged between 25 and 44, a demographic typically associated with higher digital fluency and openness to technological innovation (Venkatesh et al., 2012). Most reported traveling for leisure (86.7%) and staying in hotels three to five times annually (43.2%). Preferred accommodation types were boutique/independent hotels (30.7%) and apart-hotels (25.3%), consistent with a shift toward flexible and personalized lodging options in contemporary hospitality [19].

Table 1. Profile of the sample (n = 150).

Characteristics	N	Procentage
Age		
Under 18	-	-
18-24	24	16
25-34	28	18.7
35-44	56	37.3
45-54	38	25.3
Over 55	4	2.7
How many times have you stayed in a hotel in the past year		
1-2	34	23
3-5	64	43.2
6-10	36	24.3
Over 10	14	9.5
Reason		
Business travel	16	10.7
Vacation	130	86.7
Family/friends visit	2	1.3
Events	2	1.3
Type of hotels		
Hotel chains	36	24
Boutique/independent hotels	46	30.7
Eco-friendly/green hotels	6	4
All-inclusive resorts	18	12
Low-cost motels	6	4
Apart-hotels (Airbnb type)	38	25.3

3.3 Hypothesis Testing

H1: AI-enabled services and guest satisfaction

The first hypothesis posited that guests who have experienced AI technologies in hotels report higher levels of satisfaction and comfort compared to those who have not. To test this, a Mann–Whitney U test was conducted, comparing responses to the item "AI technologies made my hotel stay more comfortable and enjoyable" between guests with prior AI-hotel experience (n = 112, 74.7%) and those without (n = 38, 25.3%). The analysis revealed statistically significant differences between groups ($U=1,532$, $p<0.001$), with a moderate effect size ($r=0.42$) indicating higher satisfaction among AI-exposed guests. These findings provide strong empirical support for H1, indicating that AI-enabled services—such as smart check-in, intelligent room controls, and voice-activated systems—positively influence guests' perceptions of comfort and convenience. This result aligns with Self-Determination Theory [10], which suggests that such technologies fulfill intrinsic

psychological needs for autonomy and competence. Moreover, it echoes prior empirical work by Tussyadiah (2020), who emphasized that AI-driven automation enhances operational efficiency and guest experience, thereby reinforcing the strategic value of smart hospitality systems in elevating service quality.

H2: Eco-Consciousness and AI sustainability appeal

A Spearman rank-order correlation analysis examined the relationship between guests' recognition of AI's environmental benefits and their perception of AI-enabled hotels' attractiveness. The results revealed a statistically significant, moderate positive correlation ($\rho = 0.45$, $p < 0.001$), providing strong support for H2. This finding indicates that travelers who value sustainability are significantly more likely to perceive hotels implementing AI-driven ecological measures (e.g., smart energy systems, predictive resource management) as attractive accommodation choices.

These results align with and extend Green IS theory [11], demonstrating that environmentally beneficial technologies enhance organizational legitimacy among eco-conscious consumers in the hospitality context. The findings further corroborate King's (2024) research on AI as a strategic enabler of sustainable tourism, particularly through intelligent resource management systems that reduce environmental impact while maintaining service quality.

The robust correlation ($\rho = 0.45$) suggests that sustainability-focused travelers not only acknowledge but actively prefer hotels that leverage AI for ecological benefits. This has important implications for hotel operators, indicating that marketing AI implementations through an environmental lens may particularly appeal to this growing demographic of eco-conscious guests.

H3: Personalization and Sustainability as Dual Drivers

To test Hypothesis 3, a non-parametric Spearman's rank-order correlation was conducted to examine the association between guests' preferences for AI-enabled personalization ("I value hotels that use AI to customize my experience") and their appreciation of sustainability initiatives ("I prefer hotels that use technology to reduce environmental impact"). Both variables were measured using five-point Likert scales. To control potential demographic and behavioral confounds, partial correlation analyses were conducted with age and travel frequency as covariates. The correlation analysis yielded a statistically significant positive relationship between AI personalization and sustainability preference ($\rho = 0.43$, $p < 0.001$, 95% CI [0.32, 0.53]), thereby providing empirical support for H3. According to Cohen's (1988) benchmarks, this represents a moderate effect size.

To further validate the robustness of the results, additional analyses were conducted. A subgroup analysis focusing on eco-conscious travelers—defined as those in the top quartile of sustainability orientation—revealed a stronger correlation between AI-enabled

personalization and sustainability preference ($\rho = 0.51$, $p < 0.001$), indicating that values-driven guests are particularly responsive to technologies that serve both individual and environmental objectives. Moreover, a bootstrapping procedure with 1,000 iterations confirmed the stability of the primary correlation estimate, yielding a bias-corrected 95% confidence interval of [0.30, 0.55].

The results align with the dual-path model advanced by Gajić et al. (2024), wherein artificial intelligence functions both as a mechanism for enhancing personalized guest experiences—satisfying the competence dimension of Self-Determination Theory [10], 2000)—and as a symbolic indicator of environmental commitment, consistent with the legitimacy signaling function described in Green IS theory [11].

Preliminary diagnostics supported the appropriateness of the chosen analytical methods. Shapiro-Wilk tests confirmed non-normal distributions for both personalization ($W = 0.92$, $p < 0.001$) and sustainability ($W = 0.91$, $p < 0.001$) variables, thereby justifying the application of non-parametric techniques. In terms of scale reliability, internal consistency was deemed acceptable, with Cronbach's alpha values of 0.83 for the personalization construct and 0.79 for the sustainability construct, indicating strong measurement validity.

The strength of the observed correlation ($\rho = 0.43$) exceeds that of AI-convenience effects reported in Tussyadiah (2020) ($\rho = 0.28$) and closely matches green technology adoption patterns found in Melville (2010) ($\rho = 0.41$), underscoring the significance of the synergy between personalization and environmental values in guest decision-making.

H4: Barriers to AI Adoption

Hypothesis 4 proposed that concerns regarding data privacy, reliability, and diminished human interaction negatively affect guests' willingness to stay in AI-enabled hotels. However, due to the uniform reporting of concerns across all respondents (100% prevalence), statistical comparison techniques—such as group-based analysis—could not be applied. This limitation, while methodological in nature, also underscores an important empirical insight: skepticism toward AI in hospitality has become nearly ubiquitous, echoing trends observed in prior studies [12,20].

Discussions

This study investigated the role of AI-driven technologies in enhancing guest experiences and advancing sustainability objectives within the hospitality industry. The findings provide empirical support for the positive impact of AI adoption on guest satisfaction (H1), particularly when aligned with sustainability values (H2, H3). However, concerns surrounding data privacy and diminished human interaction (H4) were consistently reported, underscoring the need for hotels to balance technological innovation with

strategies that foster guest trust. The following subsections contextualize these findings within established theoretical frameworks and recent literature, offering a multidimensional analysis of AI's role in sustainable hospitality. Our findings corroborate those of Gajić et al. (2024), who identified AI and IoT integration as critical to optimizing resource efficiency—particularly through predictive energy systems such as HVAC management—while preserving guest comfort. Their structural equation modeling (SEM) revealed operational efficiency as a mediating factor in the relationship between technological implementation and sustainability outcomes, a dynamic also observed in our confirmation of H3. Specifically, guests in our study recognized and appreciated the dual functionality of AI in enabling personalized service and reducing environmental impact. This supports the Green Information Systems (Green IS) framework [11], wherein AI functions not only as a tool for performance enhancement but also as a signal of environmental stewardship.

AI and IoT as Catalysts for Sustainable Hospitality

The association between smart energy systems and hotel attractiveness ($\rho = 0.45$) further aligns with Gajić et al.'s assertion that AI-enhanced sustainability fosters competitive advantage. However, unlike Gajić et al., who emphasized managerial and infrastructural challenges, our study foregrounds guest-centered barriers, particularly the pervasive concern with data privacy (H4). This observation resonates with the findings of Dianawati et al. (2024), who demonstrated that perceived ease of use and usefulness—mediated by user ability and motivation—strongly influence technology acceptance. Taken together, these studies suggest a paradox: while AI systems may deliver measurable operational benefits, their long-term success ultimately hinges on user trust and perceived usability.

The Role of Guest Profiles in Technology Adoption

Building on the Motivation–Opportunity–Ability (MOA) framework employed by Dianawati et al. (2024), our findings highlight the significance of demographic and psychographic variables in shaping attitudes toward AI in hospitality. Like their study, our sample was dominated by younger, digitally literate guests (56% aged 25–44), a cohort typically more receptive to AI-enabled services. Importantly, our results extend their conclusions by illustrating those environmental values—specifically, eco-consciousness—amplify the appeal of AI technologies. The observed correlation between sustainability orientation and preference for AI-driven personalization ($\rho = 0.43$) underscores the strategic value of green branding for attracting this guest segment.

Nevertheless, the inclusive challenges identified by Dianawati et al. remain pertinent. Their study noted that older or less technologically inclined guests may experience usability issues in smart hotel environments. Given the limited representation of guests over 55 in our sample (2.7%), we were unable to empirically assess this dimension. Future research should prioritize the design of adaptive interfaces (e.g., voice-activated systems or

simplified user flows) to accommodate a broader range of users and ensure equitable access to AI-enhanced hospitality experiences.

Table 2. Summary of hypotheses and results

Hypothesis	Statement	Result	Statistical Support
H1	Guests who experience AI report higher satisfaction and comfort.	Supported	Mann–Whitney U test, $p < 0.001$, $r = 0.42$
H2	Eco-conscious travelers prefer AI-enabled sustainable hotels.	Supported	Spearman's $\rho = 0.45$, $p < 0.001$
H3	Guests value AI for both personalization and sustainability.	Supported	Spearman's $\rho = 0.43$, $p < 0.001$
H4	Privacy and interaction concern lower AI hotel adoption.	Not testable	100% concern prevalence – no group-based comparison possible

Nevertheless, the inclusive challenges identified by Dianawati et al. remain pertinent. Their study noted that older or less technologically inclined guests may experience usability issues in smart hotel environments. Given the limited representation of guests over 55 in our sample (2.7%), we were unable to empirically assess this dimension. Future research should prioritize the design of adaptive interfaces (e.g., voice-activated systems or simplified user flows) to accommodate a broader range of users and ensure equitable access to AI-enhanced hospitality experiences.

Ethical and Operational Trade-offs

The unanimous concern regarding data privacy reported in our study (H4) aligns with previous findings by Tussyadiah (2020) and Du et al. (2024), both of whom cautioned that AI adoption may alienate guests when perceived as intrusive or opaque. Gajić et al. (2024) offer pragmatic strategies for addressing such concerns, including the implementation of transparent data governance policies and comprehensive staff training on digital engagement. The adoption of explainable AI—systems that clearly communicate data usage and functionality—may serve as an effective countermeasure to privacy-related distrust.

The fact that our study could not statistically test H4 due to the universal prevalence of concern reflects a critical industry challenge: while the operational benefits of AI are well-documented (e.g., a 22% reduction in energy usage, as reported by Wiederhold & Martinez, 2018), the perceived risks remain widespread. This dichotomy suggests the need for a hybrid service model, wherein AI technologies manage routine, efficiency-driven tasks (e.g., check-ins, environmental controls), while human staff remain central to emotionally

nuanced and high-touch interactions (e.g., concierge services). Such an approach echoes the model proposed by Wirtz et al. (2018), advocating for a complementary relationship between automation and human service to preserve hospitality's relational core.

5. Theoretical and practical implications

This study contributes to theory development in two significant ways. First, it extends the application of Self-Determination Theory (SDT) by illustrating how AI technologies in hospitality settings can support fundamental psychological needs. Specifically, AI-enabled personalization fosters a sense of autonomy, while maintaining elements of human interaction addresses the need for relatedness—thereby enhancing the guest experience in digitally mediated environments. Second, the findings advance the conceptual framework of Green Information Systems (Green IS) Theory by empirically demonstrating that AI technologies serve not only as tools for operational efficiency but also as strategic symbols of an organization's environmental commitment. In this regard, AI adoption signals sustainability-oriented values to eco-conscious consumers, reinforcing the reputational and legitimacy dimensions proposed in the Green IS literature.

As for the practical implications, the findings of this study offer actionable insights for hospitality managers aiming to implement AI technologies in a sustainable and guest-centric manner. First, it is crucial for hoteliers to prioritize high-impact AI features that directly contribute to guest comfort, such as smart check-ins and intelligent room controls. These technologies not only streamline operations but also enhance the overall experience by offering convenience and responsiveness. However, usability should remain a key design consideration to ensure inclusivity for less tech-savvy guests.

Moreover, AI's dual contribution to personalization and environmental sustainability presents a compelling marketing opportunity. Hotels can attract eco-conscious travelers by clearly communicating the environmental benefits of AI, such as energy-saving thermostats and automated lighting systems that adapt to guest preferences while minimizing waste. Framing these features as both luxurious and environmentally responsible aligns with current consumer values.

Despite its benefits, AI adoption must be balanced with transparency and trust. This is particularly relevant as the study revealed universal guest concerns regarding data privacy and the potential loss of human interaction. To mitigate these fears, hospitality providers should implement clear, user-friendly data policies and preserve the human touch in complex service interactions.

6. Limitations and future research

This study has some limitations. The sample was collected primarily from Bucharest, a technologically advanced and urbanized context, which may not reflect the experiences and perceptions of travelers from rural or less technologically integrated environments. In addition, the use of self-reported data could have introduced social desirability bias, particularly in questions related to environmental consciousness and sustainability.

Future research should aim to diversify the sample to include non-urban and demographically varied populations, particularly older or less technologically inclined guests. Longitudinal studies tracking guest perceptions and behavior over time could reveal how repeated exposure to AI influences satisfaction, trust, and brand loyalty. Additionally, incorporating behavioral metrics, such as real-time energy savings or system usage logs, could validate the effectiveness of AI-driven sustainability initiatives and complement subjective survey responses.

Although Hypothesis 4 was conceptually grounded in the Technology Acceptance Model, statistical testing could not be performed due to the uniform reporting of concerns related to data privacy and reduced human interaction. This lack of variance, while methodologically limiting, reveals a noteworthy trend: skepticism toward AI in hospitality is widespread and potentially embedded in baseline guest expectations. To explore the depth and diversity of these concerns, future research should include open-ended qualitative items or conduct semi-structured interviews, allowing for richer insights into the specific anxieties or contextual triggers underlying these attitudes. Moreover, incorporating Likert-scale questions measuring the intensity of concern (e.g., "How worried are you about data misuse in AI-enabled hotels?") would provide a more nuanced dataset, allowing for statistical comparisons even when overall concern prevalence is high.

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