

# **Smart Services to Sustainable Behavior: Examining the Role of Green Communication in Generation Y Guests at Green Hotels in Phuket, Thailand**

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## **Abstract**

The study examines how smart hotel service attributes influence Generation Y sustainable behavior through green communication. Utilizing a dataset of Generation Y of 398 hotel guests in Phuket (Thailand) to green hotels in Phuket, Thailand, Partial Least Squares Structural Equation Modeling (PLS-SEM) demonstrated that green communication is positively influenced by convenience, safety, and personalization, which in turn strongly predicts sustainable hotel guest behavior. However, contactless services had no effect. The findings of the importance of green communication in behavioral change offer insight for hotel owners trying to link digital innovation with sustainability goals.

**Keywords:** Generation Y, Smart hotels, Green communication, Sustainable behavior, Green hotels, Generation Y, Thailand tourism

## **Introduction**

Tourism is one of the world's most rapidly growing industries, generating environmental concerns regarding the industry. The hospitality industry has implemented sustainability principles, particularly in smart hotels, in response to changing rules and regulations, sustainability goals, and pressure from

environmentally conscious visitors. Moreover, the UN's SDGs encourage technology innovation, which encourages sustainable development (Buhalis et al., 2023).

Among the emerging smart destinations, Phuket, Thailand, provides a compelling context for comprehending the impact of digital innovations on tourist behaviors. The paradox of environmental degradation and tourism-driven economic development confronts Phuket, one of Southeast Asia's most popular beach destinations (Moukomla & Marome, 2025). In this changing context, smart hotels offer AI-enabled services, energy-saving technologies, contactless check-in, and real-time communication tools to improve visitor experience and promote, which is one of the most popular beach destinations in Southeast Asia, is at the same time confronted with the paradox of environmental degradation and economic development, generating environmental responsibility.

Several studies have examined smart hotel technological infrastructure and operational efficiency (Elshaer & Marzouk, 2024; Kim & Han, 2020), but few have examined how technological affordances affect sustainability behavior, specifically green communication. Moreover, the term "green communication" denotes the exchange and dissemination of environmental values, intentions, and practices between the hotel and its visitors. This communication influences consumer awareness and sustainable behavior (Genç, 2017; Torelli et al., 2020).

Generation Y (Millennials), born 1981–1996, also affects the hotel business. This population values the environment and purchases appropriately (Chung, 2020; Han et al., 2020). The contextual and experiential cues of the hotel environment, which includes service personalization, safety, control systems, and interactions with staff and technology, significantly impact sustainable behavior (Han & Hyun, 2018; Shang et al., 2010). Nevertheless, Generation Y visitors are uniquely positioned to respond to green communication that is smart-enabled and integrated into hotel operations, given their ability to use technology.

To address the gap, this study empirically examines Generation Y customers' green communication activities and how they contribute to sustainable hotel guest behavior. Drawing from smart hotel constructs including Convenience & Control, Maintenance & Safety, Personalization, and Untact (contactless service) this research integrates a structural equation modeling (PLS-SEM) approach to assess both direct and indirect pathways leading to sustainable behavior.

Research on Generation Y guests at Phuket smart hotels found interesting

patterns. As reported in the results, the perceived convenience and control, along with maintenance and safety, had significant direct effects on guests' willingness to engage in green communication. In turn, this communication significantly predicted their sustainable behavior, thereby validating the mediating role of green messaging. However, while adaptability had a favorable effect, the “untact” (contactless) service component did not, suggesting that automation may not affect Thai environmental value.

This research advances sustainable tourism management theory and practice through contextualizing these findings within smart hospitality and generational consumer trends. The study provides practical insights for hotel owners in growing markets like Thailand who want to integrate technology with guest interaction.

## **Literature Review**

### **Generation Y and Pro-Environmental Consumer Behavior**

Millennials, also referred to as Generation Y, are a critical demographic in the tourism industry. According to Han et al. (2011) and Chung (2020), they postulate that their values, lifestyles, and digital fluency qualify them as both early adopters of innovation and active agents of sustainability. Research shows that Gen Y guests tend to exhibit higher concern for ecological issues and are more likely to support brands and businesses that reflect their values (Han et al., 2020; Luo & Bhattacharya, 2006). This attitude-behavior relationship requires situational cues and contextual engagement (Lo et al., 2012).

According to Alsmadi (2007) and Peattie and Peattie (2009) found that environmental awareness does not motivate sustainable behavior. However, trust, control, simplicity of adoption, and emotional resonance are frequently necessary to raise awareness of "green" behavior.

This generation is also drawn to "nowness" services—instant, responsive, and digitally mediated experiences that fit their mobile lifestyles (Buhalis & Sinarta, 2019). Thus, if smart hotel services are frictionless and individually meaningful, they can promote environmental sustainability.

### **Smart Hotels and the Rise of Digital Sustainability**

Digital transformation is transforming hotel service, guest experiences, and

operational efficiency (Buhalis & Leung, 2018). The Internet of Things (IoT), AI-enabled personalization, real-time analytics, and mobile communication platforms enable seamless, personalized, and adaptive guest experiences in smart hotels (Gretzel et al., 2015; Kim & Han, 2020).

In the context of sustainability, smart hotels have the potential to significantly reduce energy use, optimize resource allocation, and reduce environmental footprints through automation and responsive system design (Buhalis et al., 2023). However, this paradigm called "digital sustainability" uses smart technologies to mold pro-environmental visitor behavior rather than just for convenience (Ivanov et al., 2019; Neves et al., 2024).

However, the effectiveness of these technologies hinges not only on system functionality but also on guest perception and behavioral response. Technologies must support voluntary sustainability through meaningful communication and intuitive design. Thus, this study examines how green communication affects guest perception and behavior across digital service qualities such as convenience & control, maintenance & safety, personalization, and untact (contactless service).

## **Green Communication**

Green communication serves as a crucial mechanism through which environmental values and operational messages are conveyed to guests. This includes verbal cues from staff, in-room digital alerts, mobile notifications, visible signage, and app interfaces, all of which are designed to influence visitor behavior without coercion (Genç, 2017; Torelli et al., 2020). Green communication encourages guests to join in sustainability activities and co-create environmental value.

Green communication has been proven to enhance behavioral intention and actual actions, including towel reuse, energy conservation, and waste reduction, particularly when guests perceive the communication as authentic, timely, and consistent with their personal values (Han & Hyun, 2018; Mosca et al., 2024). This effect is magnified when green message is included in Gen Y-preferred technology-mediated channels such mobile apps or smart room controls (Chi et al., 2022; Jeong & Shin, 2020).

Furthermore, guests who feel that green behavior is socially supported or institutionally facilitated (via communication) are more likely to act, reinforcing the

need for hotels to integrate communication strategies into their technological architecture. Thus, this study conceptualizes green communication as a mediator linking hotel service features to sustainable guest.

### **Defining Sustainable Hotel Guest Behavior**

The dependent variable in this study is Sustainable Hotel Guest Behavior (SHGB), which defines guests' voluntary environmental efforts throughout their stay. These include energy conservation, water-saving behaviors, towel reuse, recycling, and participation in hotel-led sustainability programs (Han & Hyun, 2018; Shang et al., 2010). Moreover, the Font et al. (2016) study found that personal drive and contextual design influence behavior.

As important, guests sustainable actions are influenced by the perceived simplicity, relevance, and reward of the activity (Han et al., 2020). Thus, guest activity increases in hotels that utilize smart infrastructure, automation, and effective communication.

The guest's psychological contract with the brand increases when green conduct is perceived as important for the hotel's brand identity and emotional experience (Merli et al., 2019). This helps to build long-term relationships with eco-conscious guests and promote sustainable innovation.

### **Conceptual Model and Hypotheses Development**

This study proposes a conceptual model that integrates four smart service dimensions: Convenience & Control, Maintenance & Safety, Personalization, and Untact as independent variables influencing Green Communication, which predicts Sustainable Hotel Guest Behavior (SHGB). Research on behavioral transmitting suggests that Green Communication mediates (Mosca et al., 2024; Shang et al., 2010).

In the context of environmental psychology and service innovation literature, communication and perception affect relevant indicators of pro-environmental behavior (Gretzel et al., 2015; Tversky & Kahneman, 2000). The structural model that was tested using PLS-SEM confirms several important hypothesized paths:

H1: Convenience & control positively affects green communication

H2: Maintenance & safety positively affects green communication

- H3: Personalization positively affects green communication  
H4: Untact positively affects green communication  
H5: Green communication positively affects sustainable hotel guest behavior  
H6: Convenience & Control mediates the relationship between Green Communication and Sustainable Hotel Guest Behavior  
H7: Maintenance & Safety mediates the relationship between Green Communication and Sustainable Hotel Guest Behavior  
H8: Personalization mediates the relationship between Green Communication and Sustainable Hotel Guest Behavior  
H9: Untact mediates the relationship between Green Communication and Sustainable Hotel Guest Behavior

### **Methodology**

The data were collected in Phuket, Thailand, via a non-probability purposive sampling approach in April and May 2024. The sample consisted of Generation Y visitors (aged 25–40) who had stayed at smart green hotels in Phuket for a minimum of one night. A total of 398 valid questionnaires were obtained, with an estimated response rate of 85%. The selection of eight hotels was determined. These hotels adhere to the Travel Authority of Thailand (TAT) and ASEAN Green Hotel Standard standards (Department of Climate Change and Environment, 2024)

The six questionnaire sections measured essential constructs from the proposed study model. All items were assessed using the seven-point Likert scale, with 1 indicating severe disagreement and 7 strongly agreeing. The measurement items were modified from approved literature instruments for conceptual and content validity: The convenience and control (eight items); maintenance and safety (five items); and personalization (three items). were adopted from Han et al. (2020) study. The untact was measured via four items modified from Yang et al. (2021) study. The green communication was measured via three items adapted from Lee and Cheng (2018) study, and the measured sustainable hotel guest behavior via two items, modified from (Trang et al., 2019) study. A panel of three tourism and hospitality specialists examined all item wordings for cultural appropriateness, clarity, and relevance to Phuket hotels. A 30-person pilot test preceded full-scale data collection. No significant modifications were required.

The suggested model was tested using the Partial Least Squares (PLS) approach. Based on the variance of dependent variables, PLS is a specific kind of structural equation modeling (SEM) (Hair, 2017). It is crucial to note that the PLS-

SEM method does not require the data to follow a normal distribution. The PLS technique uses nonparametric bootstrapping to obtain standard errors for testing hypotheses. Therefore, if the data distribution is unknown or deviant from normal, we can apply PLS-SEM (Hair et al., 2011). Thus, these methods are consistent with best practices in marketing and hospitality research using PLS-SEM (Cepeda-Carrion et al., 2019; Hair, 2017).

## **Results**

### ***Measurement model***

The Confirmatory Factor Analysis (CFA) was conducted to assess the reliability and validity of the measurement model. The results, as summarized in Table 1, indicate strong evidence of model fit, with all constructs demonstrating robust reliability and convergent validity. All individual items loaded significantly and strongly onto their respective latent constructs. The factor loadings ranged from 0.719 to 0.936, all exceeding the recommended threshold of 0.70, which provides strong support for the items' convergent validity. The internal consistency of the constructs was evaluated using Cronbach's Alpha, rho\_A, and Composite Reliability (CR). All measures exceeded the conventional cutoff of 0.70, with many values well above 0.80, indicating high internal consistency. The Composite Reliability for all factors ranged from 0.847 to 0.946. Convergent validity was established by assessing the Average Variance Extracted (AVE). All factors had an AVE value greater than the recommended 0.50 threshold, with values ranging from 0.626 to 0.864. This signifies that each latent construct accounts for a majority of the variance in its corresponding items.

<b>Table 1</b> Confirmatory factor analysis					
	<b>Factor loading</b>	<b>Cronbach's Alpha</b>	<b>rho_A</b>	<b>CR</b>	<b>AVE</b>
Convenience & Control		0.914	0.921	0.930	0.626
CC2	0.731				
CC3	0.758				
CC4	0.719				
CC5	0.838				
CC6	0.832				
CC7	0.887				
CC8	0.759				
CC9	0.790				
Maintenance & Safety		0.928	0.929	0.946	0.777
MS1	0.860				
MS2	0.885				
MS3	0.872				
MS4	0.928				
MS5	0.861				
Personalization		0.731	0.743	0.847	0.649
Per1	0.831				
Per2	0.761				
Per3	0.822				
Untact		0.837	0.848	0.892	0.674
Un1	0.740				
Un2	0.847				
Un3	0.883				
Un4	0.807				
Green Communication		0.850	0.851	0.909	0.770
Com1	0.835				
Com2	0.892				
Com3	0.904				
Sustainable Hotel Guest Behavior		0.843	0.848	0.927	0.864
SHGP1	0.923				



<b>Table 1</b> Confirmatory factor analysis					
	<b>Factor loading</b>	<b>Cronbach's Alpha</b>	<b>rho_A</b>	<b>CR</b>	<b>AVE</b>
SHGP2	0.936				

**Source:** Authors

The Fornell-Larcker Criterion was used to assess the discriminant validity of the model's constructs (See in Table 2). Discriminant validity ensures that each construct is truly distinct and not overly correlated with the others. The criterion is met when the square root of a construct's Average Variance Extracted (AVE) is greater than its highest correlation with any other construct. In the provided table, the square root of the AVE is shown on the diagonal, while the off-diagonal values represent the correlations between constructs. As the results show, the square root of the AVE for every factor is larger than its highest correlation with any other factor in the model. This confirms that all constructs are empirically distinct from each other.

The Heterotrait-Monotrait (HTMT) ratio was employed to assess the discriminant validity of the model's constructs rigorously. The HTMT method is widely recognized as a robust and sensitive test for ensuring that constructs are empirically distinct and not overly correlated. The established guideline for discriminant validity using HTMT is that the ratio between any two constructs should ideally be below 0.85. Values exceeding this threshold suggest a potential lack of distinctiveness between the constructs, indicating they might be measuring the same underlying concept. As observed from the HTMT ratio table, all calculated values fall below the 0.85 threshold (See Table 3). The highest HTMT ratio recorded was 0.829, which represents the relationship between "Maintenance & Safety" and "Untact." Even this highest value remains comfortably beneath the critical cutoff.

<b>Table 2</b> Fornell-Larcker Criterion						
	1	2	3	4	5	6
1. Convenience & Control	0.79 1					
2. Green Communication	0.69 3	0.87 8				

<b>Table 2</b> Fornell-Larcker Criterion						
	1	2	3	4	5	6
3. Maintenance & Safety	0.74 7	0.63 0	0.88 1			
4. Personalization	0.42 5	0.43 0	0.35 6	0.80 6		
5. Sustainable Hotel Guest Behavior	0.53 5	0.55 4	0.51 5	0.56 8	0.93 0	
6. Untact	0.56 9	0.47 9	0.81 9	0.22 7	0.40 7	0.82 1

**Source:** Authors

<b>Table 3</b> Heterotrait-Monotrait Ratio (HTMT)						
	1	2	3	4	5	6
1. Convenience & Control						
2. Green Communication	0.779					
3. Maintenance & Safety	0.806	0.707				
4. Personalization	0.513	0.542	0.424			
5. Sustainable Hotel Guest Behavior	0.609	0.653	0.581	0.718		
6. Untact	0.647	0.565	0.829	0.288	0.484	

**Source:** Authors

### ***Hypotheses testing***

Table 4 and Figure 1 present the results of a path analysis, which examines the direct relationships between your study's factors. This indicates that as hotel guests perceive higher levels of convenience and control, their willingness to engage in green communication increases significantly, accepting H1. The path coefficient of 0.447 suggests a notable effect size. There is a positive and statistically significant relationship. The p-value of 0.004 confirms that perceptions of better maintenance and safety positively influence green communication behavior, accepting H2. There is a positive and highly significant relationship. This suggests that personalized services, while having a smaller path coefficient (0.153) than the other significant factors, still have a reliable, positive impact on a guest's green communication, accepting H3. The relationship here is not statistically significant. With a p-value of 0.718 (which is much greater than 0.05), the observed negative coefficient (-0.022)

is not a meaningful finding. This implies that the perception of 'untact' services has no significant effect on a guest's green communication, rejecting H4. There is a very strong, positive, and highly significant relationship. The path coefficient of 0.554 is the largest in the entire table, and the p-value of 0.000 confirms the extreme significance of this link. This is a crucial finding, as it shows that a guest's engagement in green communication is a powerful predictor of their overall sustainable behavior at the hotel, accepting H5.

<b>Table 4</b> Direct effect						
	Original Sample	Sample Mean	Standard Deviation	T	P	Results
H1: Convenience & Control -> Green Communication	0.447	0.448	0.070	6.395	0.000	Accepted
H2: Maintenance & Safety -> Green Communication	0.260	0.257	0.091	2.854	0.004	Accepted
H3: Personalization -> Green Communication	0.153	0.155	0.042	3.612	0.000	Accepted
H4: Untact -> Green Communication	-0.022	-0.018	0.062	0.361	0.718	Rejected
H5: Green Communication -> Sustainable Hotel Guest Behavior	0.554	0.554	0.046	12.007	0.000	Accepted

**Source:** Authors

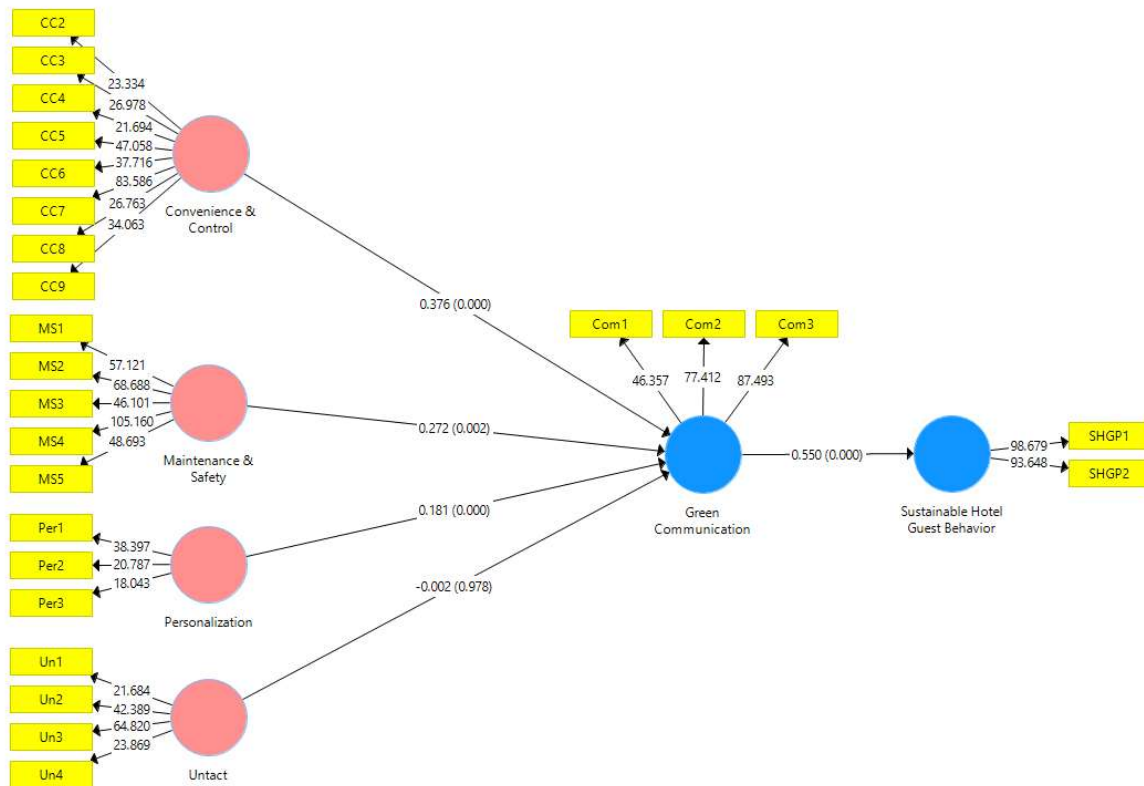
Table 5 presents the results of a mediation analysis, specifically focusing on the indirect effects. An indirect effect examines how an independent variable influences a dependent variable through a mediating variable. This is a crucial finding, indicating that Convenience & Control positively influences Sustainable Hotel Guest Behavior indirectly through its positive effect on Green Communication. This suggests that by enhancing convenience, hotels can encourage green communication, which in turn fosters more sustainable guest behavior, accepting H6. This shows that the influence of Maintenance & Safety on Sustainable

Hotel Guest Behavior is also significantly mediated by Green Communication. High perceptions of maintenance and safety appear to encourage green communication, which then contributes to broader sustainable actions, accepting H7. This confirms that Personalization also has a significant indirect effect on Sustainable Hotel Guest Behavior through Green Communication. Providing personalized services leads to increased green communication, which subsequently influences sustainable actions, accepting H8. This finding is consistent with the direct effects analysis where 'Untact' also showed no significant direct relationship with Green Communication. This implies that 'Untact' services do not have a meaningful indirect effect on sustainable behavior via green communication, rejecting H9.

**Table 5** Indirect effect

	Original Sample	Sample Mean	Standard Deviation	T	P	Results
H6: Convenience & Control -> Green Communication -> Sustainable Hotel Guest Behavior	0.247	0.248	0.041	6.026	0.000	Accepted
H7: Maintenance & Safety -> Green Communication -> Sustainable Hotel Guest Behavior	0.144	0.143	0.054	2.682	0.007	Accepted
H8: Personalization -> Green Communication -> Sustainable Hotel Guest Behavior	0.085	0.086	0.027	3.152	0.002	Accepted
H9: Untact -> Green Communication -> Sustainable Hotel Guest Behavior	-0.012	-0.010	0.034	0.360	0.719	Rejected

**Source:** Authors



**Figure 1: Structural equation model**

**Source:** Smart PLS 4.0

## Discussion

Our results demonstrate that investments in green communication and smart hotel service qualities affect Generation Y guests' sustainable behavior. The findings from a structural equation model of 398 international visitors to green hotels in Phuket, Thailand, show how digital hospitality infrastructure might influence pro-environmental guest behavior.

The findings of this research contribute to the literature on convenience and control, indicating that these factors are the most significant predictors of green communication. This suggests that Generation Y guests are more inclined to discuss and act on sustainability issues because they can personalize and regulate their stay environment. Similar to previous study (Buhalis & Sinarta, 2019; Kim & Han, 2020), smart thermostats, lighting control, and personalized interfaces reinforce the idea that sustainable activities are straightforward, non-disruptive, and experience.

Similarly, Maintenance & Safety showed a strong and statistically significant relationship with green communication, reaffirming that operational reliability and the perception of cleanliness and safety underpin guests' willingness to trust and engage with the hotel's environmental messaging. Post-pandemic, hygiene expectations rose (Chen et al., 2021). The results show that safety measures are both health regimens and behavioral buy-in enablers. However, visitors are more likely to respond favorably to messages that encourage them to contribute to more extensive sustainability objectives when they experience physical security.

Personalization showed an impact on green communication. Generation Y wants personalized services and digital systems that anticipate their requirements (Jeong & Shin, 2020). However, guests may not understand the environmental impact of customization unless expressly stated. Thus, emotional resonance and value congruence are necessary to turn personalized service into sustainable action (Han et al., 2020). For example, personalized in-room messages, such as *"We saved 25 liters of water due to your towel reuse,"* serve as an illustration of a guest's environmental impact.

Untact—contactless and automated service delivery—did not significantly affect green communication or sustainable behavior. There is an explanation. First, guest perceptions of contactless services may be more convenient than sustainable (Chi et al., 2022). Automation is susceptible to becoming invisible if it is not explicitly framed, as it may operate in the background without influencing behavior. Second, hospitality emotions depend on friendliness and interaction (Han & Hyun, 2018). This may limit socially driven green influence, such as staff motivation or communal norms. So, untact technologies need deliberate messaging to indicate their environmental purpose. In particular, self-check-in kiosks that inform customers about automated paper waste and energy savings may be seen as sustainable.

The most important finding in this study is the role of green communication as a mediator between service attributes and sustainable guest behavior. This confirms that environmental messaging catalyzes behavioral change. Moreover, the mediation analysis confirmed that Convenience & Control, Maintenance & Safety, and Personalization all exert significant indirect effects on Sustainable Hotel Guest Behavior via green communication. These findings are consistent with previous research by Torelli et al. (2020) and Mosca et al. (2024) found that the need for hotels is to design communication that is authentic, embedded, and emotional. However, the effective green communication goes beyond signage. It includes (1) real-time digital prompts (e.g., *"Turn off the lights to help save 12.4 kWh this week"*) (2) personalized mobile notifications (*"You saved 0.8 kg of CO<sub>2</sub> during your stay!"*) and (3) in-room dashboard summaries of sustainability metrics. Thus, these communicative elements make abstract values concrete, empowering guests to see themselves as active participants in collective environmental goals.

### **Implications**

The findings of this study offer significant theoretical contributions to the field of travel and tourism marketing by elucidating key concepts. Firstly, the focus is on features that enhance guests' control and autonomy. The goal is to create a user-friendly and uncomplicated sustainability experience (e.g., one-touch eco-modes, optional towel reuse notifications). Secondly, the hygiene and operational assurance should be communicated not just as risk-reduction but as part of the hotel's commitment to environmental well-being (e.g., chemical-free cleaning, energy-efficient air circulation). Thirdly, the humanize automation adds environmental storytelling to contactless systems. For example: *"Using this mobile key reduced our plastic card waste by 17 kg last year."* Fourthly, train staff as sustainability ambassadors as role of hotel staff remains vital in reinforcing messages and inviting behavioral participation through subtle nudges. Lastly, use personalization to deliver individualized sustainability reports and suggestions (e.g.,

eco-leaderboards, badges for green behavior), encouraging gamification and social comparison.

### Limitations and Future Research

Our research goals were met, although there are still limitations. We have limited the study to green hotels in Phuket, Thailand. Although the destination enjoys global recognition, its sociocultural context may diverge from Western markets. Replication in other regions is necessary for broader generalization. Although targeted at Generation Y, the findings may not apply to other segments such as Generation Z or Baby Boomers. Future studies could adopt a generational comparison. Future research is necessary for experiments that are emerging and evolving. Given the central role of green communication, experimental designs could test message tone, framing, and delivery mode (e.g., gamified vs. informative; visual vs. verbal) to find guest profile-optimal techniques.

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