

Research on the Optimization of Personalized Service Capabilities in Hotel Green Marketing

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Abstract: With the exacerbation of the global climate crisis and the awakening of green consumption awareness, the tourism industry urgently needs to transform towards a sustainable model. This study focuses on the hotel industry and explores the driving mechanism of green marketing strategies on the personalized service capability based on the Theory of Planned Behavior (TPB). Through multi-case analysis and empirical research, it constructs an influencing factor model for green marketing strategies encompassing three dimensions: behavioral attitude, subjective norm, and perceived behavioral control. Using the Analytic Hierarchy Process (AHP), it quantifies the weights of the elements and proposes optimization paths. Findings reveal that: elements related to behavioral attitude (weight: 64.78%) have the most significant driving effect, with green product innovation (27.89%), encouraging green consumption habits (27.20%), and designing green buildings (22.40%) serving as core drivers; subjective norm (20.26%) and perceived behavioral control (14.96%) follow, with response to regulations and application of digital tools playing key roles. At the practical level, it validates the effectiveness of the dynamic balance mechanism of "environmental benefit—customer value—operational efficiency" and proposes optimization strategies such as immersive experience integration, data-driven service design, and technology-enabled dynamic adjustment. This study provides a theoretical framework and practical paradigm for the green transformation of hotels, and offers references for public decision-making to improve industry standards and balance compliance and competitiveness.

Keywords: Theory of Planned Behavior; Green Marketing; Personalized Service; Hotel; AHP

1.Introduction

The global rise in environmental awareness has propelled green consumption to emerge as a core value orientation of the 21st century. As a carbon-intensive sector, tourism contributes 8% of global building energy consumption, with its per-unit area carbon emission intensity 2-3 times that of ordinary commercial buildings. Against this backdrop, China's Implementation Plan for Carbon Peak in Urban and Rural Construction mandates full compliance with green building standards for new hotels by 2025, while the EU's Carbon Border Adjustment Mechanism (CBAM) accelerates decarbonization among transnational hotels. Despite efforts by enterprises like IHG and H World to launch green guest rooms and energy-saving technologies, challenges persist, including consumer perception biases, inadequate service standardization, and the absence of a carbon footprint accounting system.

Personalized service capability, a cornerstone of hotels' differentiated competition, intersects closely with consumer behavior theory. The Theory of Planned Behavior (TPB) posits that behavioral intention is shaped by three factors: attitude, subjective norm, and perceived behavioral control. In green marketing contexts, consumers' attitudes toward environmental measures (e.g., recognition of biodegradable tableware), social norms (e.g., dissemination of sustainability initiatives), and perceived behavioral control (e.g., ease of waste sorting) collectively influence decision-making. Existing research has focused on single dimensions—either green marketing or personalized services—rather than systematically analyzing their synergies.

This study advances in three stages: first, examining internal motivations and external constraints of green marketing strategies across five case hotels, grounded in TPB's three elements; second, constructing a hierarchical model of influencing factors and quantifying key drivers via questionnaire surveys; third,

proposing optimized paths for precise green marketing to help hotels balance regulatory compliance and market competitiveness, while providing theoretical support for enhancing personalized service capabilities.

2.Literature Review

2.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB), proposed by Icek Ajzen in 1985 as an extension of the Theory of Reasoned Action (TRA), posits that behavioral intention is the core determinant of human actions. Its framework includes three critical variables: behavioral attitude (individual value judgments about outcomes), subjective norms (perceived social pressure or expectations), and perceived behavioral control (belief in one's ability to execute the behavior). These elements collectively shape behavioral intention, ultimately influencing actions, and transcend traditional rational actor assumptions by revealing socio-psychological interplay in decision-making.

In tourism research, TPB applications focus on four directions. First, behavioral prediction. Bamberg et al. (2003) demonstrated that the three elements of TPB explained 60% of variance in tourists' travel mode choices^[1]; Mohd et al. (2023) further showed these variables, together with social media usage and electronic word-of-mouth, accounted for 53% of variance in post-pandemic rural Indian tourism intentions^[2]. Second, green consumption decisions. Verma and Chandra (2018) expanded TPB, finding moral reflectiveness enhances Indian youth's willingness to visit green hotels^[3]; Li et al. (2021) introduced virtual tourism experiences, identifying perceived behavioral control as a positive moderator of offline tourism conversion^[4]. Third, corporate practice validation. Wu et al. (2024) integrated gamification theory, showing achievement motivation indirectly strengthens revisit intention via enhancing subjective norms and attitudes, though excessive perceived behavioral control may inhibit behavioral translation^[5]. Fourth, social group analysis. Liao et al. (2020) revealed Chinese consumers' food waste is dual-driven by attitude ($\beta=0.32$) and subjective norms ($\beta=0.41$)^[6]; Elhoushy et al. (2020) validated TPB's organizational management applicability, demonstrating social norms constrain hotel managers' attitudes toward

female employment^[7].

2.2 Green Marketing

Green marketing theory emerged from environmental economics and sustainability studies in the mid-20th century. Kenneth Boulding's (1964) Spaceship Earth Model first systematically argued the constraints of finite resources on economic systems, laying the foundation for ecological marketing. The American Marketing Association (AMA, 1975) coined the term "ecological marketing," emphasizing product design to reduce environmental burdens. Peattie (1992) further defined it as "balancing corporate profits with environmental carrying capacity^[8]," outlining its evolution from ecological to environmental and sustainable marketing^[9]. Polonsky (1994) reframed it as "all exchange activities that satisfy needs while minimizing environmental harm^[10]." Recent studies emphasize value co-creation: Ottman (2011) advocated consumer education for fostering environmental values^[11], while Belz and Peattie (2012) highlighted its transformation into stakeholder-collaborative value networks^[12]. This study adopts Gan Biquan's (1997) definition: marketing strategies centered on environmental protection and meeting consumer green demands^[13].

Existing hotel green marketing research forms four dimensions. First, strategy optimization. Ying (2019) proposed dynamic market responsiveness through real-time monitoring to balance sustainability and profitability^[14]; Wang (2021) emphasized clarifying triple value connotations (conceptual innovation, product optimization, service upgrading) to enhance practicality^[15]. Second, consumption drivers. Guo and Xu (2022), applying social exchange theory, confirmed reciprocal cooperation stimulates customers' green consumption intention^[16]; Chen and Liu (2023) advocated constructing a "cognition-identification-value" closed loop via market education^[17]. Third, collaborative innovation. Chung (2020) found green management indirectly boosts customer loyalty through environmental benefits^[18]; Hill (2020) warned of integrating green products into strategic systems to address demand shifts^[19]; Naikoo et al. (2020) demonstrated circular economy-green marketing synergy's role in hotel sustainability^[20]; Xu (2021) proposed a full-chain greening plan for Hainan hotels^[21]. Fourth, operational innovation. Hai (2022)

advocated reconstructing management systems via circular economy to achieve economic-ecological symbiosis^[22]; Li (2023) outlined low-carbon scenarios through green culture cultivation, staff training, and energy-saving equipment deployment^[23].

2.3 Personalized Services

Personalized service theory emerged from Western demand for upgraded consumption patterns, evolving through market dynamics. Zhang and Jin (2005) identified dual connotations—differentiated services to enhance loyalty and unique service offerings^[24]. Yu (2019) conceptualized it as "value creation beyond customer expectations^[25]." Domestic scholars emphasize three core features: demand orientation^[26], differentiated supply^[27], and technology empowerment^[28].

Hotel personalized service research develops in three theoretical dimensions. First, technology-driven approaches. Luo and Zou (2020) validated the "Internet + data platform" model for precise service delivery via customer profiling, reducing labor costs through smart room systems^[29]; Zhang (2024) proposed a "central data platform + decentralized execution" mechanism balancing standardization costs and personalized gains^[30]. Second, demand adaptation. Yang and Wang (2021) designed a "three-tier response mechanism" for VIP clients to enhance experience value through service stratification^[31]; Shao (2021) innovated culinary services with "local ingredients + cultural narratives" to strengthen perceived value^[32]. Third, organizational support systems. Meng (2021) demonstrated process reengineering's role in reducing complaint rates via service mechanism innovation^[33]; Zhang et al. (2023) empirically proved dynamic balance between standardization and personalization optimizes cost-effectiveness^[34].

In summary, TPB research exhibits three trends: interdisciplinary integration, contextual expansion, and localization validation. However, limitations persist in cultural adaptability, dynamic responsiveness, and industry specificity. Hotel green marketing and personalized service studies face three gaps: overreliance on high-end hotel cases, insufficient cross-cultural comparisons (especially in emerging markets), and conceptual rather than technology-grounded implementation strategies. This study addresses

TPB's explanatory gaps in hotel green marketing through in-depth analysis of influencing factors and an evaluation model, offering novel perspectives for balancing regulatory compliance, market competitiveness, standardized efficiency, and personalized value.

3. Case Study

3.1 Case Selection

This study selects five hotel enterprises—H World Group, InterContinental Hotels Group (IHG), Hangzhou Dinglan Junshang Yunli Hotel, Hangzhou Zhongshan Xizi Lake Hotel, and Fubang Lijia International Hotel—as case subjects based on three evaluation criteria: brand representativeness, data availability, and geographical distribution.

Brand representativeness prioritizes H World (domestic chain) and IHG (international premium brand) as industry leaders to exemplify benchmark roles in green marketing, while Dinglan (boutique design-oriented), Zhongshan Xizi Lake (culture-themed), and Fubang Lijia (regional mid-range) cover differentiated market segments to ensure representativeness and diversity. For data accessibility, H World and IHG provide standardized data through their publicly disclosed sustainability reports as listed companies. The three domestic enterprises are analyzed via field surveys to obtain operational details (e.g., energy management, guest room recycling), supplemented by expert interviews to validate findings through triangulation. Geographical distribution integrates multinational brands (H World, IHG) with domestic players (Dinglan, Zhongshan Xizi Lake, Fubang Lijia), spanning Hangzhou samples and international brands' localization cases. This design enables analysis of how regional economic levels and policy environments differentially influence green marketing outcomes. The multi-dimensional screening ensures methodological rigor and practical relevance, providing empirical grounding for strategy classification and theoretical model construction

3.2 Classification Criteria

Grounded in TPB framework, this study analyzes the internal and external driving factors of green marketing strategies in selected cases from the three dimensions of behavioral attitude, subjective norm, and perceived behavioral

control. It categorizes three strategies based on their driving factors, aiming to identify the common influencing factors of green marketing

strategies and provide empirical evidence for further quantitative analysis. The core logic of the classification criteria is presented in Table 1.

Table 1. TPB Classification Criteria for Hotel Green Marketing Strategies

Classification Criteria	Core Logic
Behavioral Attitude-Based Green Marketing Strategies	Directly shape positive attitudes among consumers and stakeholders by fostering environmental values and demonstrating corporate environmental commitments.
Subjective Norm-Driven Green Marketing Strategies	Encourage behaviors aligned with environmental requirements through social norms, group pressure, or policy guidance.
Perceived Behavioral Control-Mediated Green Marketing Strategies	Reduce the difficulty of implementing environmental behaviors and enhance feasibility via technological innovation and process optimization.

Source: compiled by the authors.

3.3 Case Analysis

3.3.1 Behavioral attitude-based green marketing strategies

The behavior attitude-based green marketing strategy of the selected enterprises primarily unfolds across five dimensions: green building and environmental creation, green food ingredient procurement, eco-friendly guest room product design, consumption habit guidance, and public welfare and ESG information disclosure. Through multi-scenario practices, this strategy influences consumers' environmental awareness and behaviors.

At the level of green building and environmental creation, all five enterprises adopt environmentally friendly building materials and energy-saving equipment, systematically planning green ecological environments to convey their environmental commitments. Among them, H World has launched a "modular construction solution" through supply chain integration, disassembling hotel facilities into standardized modules and applying environmentally friendly materials and prefabricated construction techniques, which has significantly reduced construction waste, dust, and noise pollution. The modularization ratio of its Han Ting 3.5 version reaches 90%, with single-room renovation time shortened to 7 days. The group widely implements green building standards and actively participates in certifications, which not only lowers technical implementation thresholds and enhances franchisees' confidence in execution but also strengthens the conveyance of environmental commitments through certifications, effectively shaping the enterprise's green image.

In terms of food ingredient procurement, the case enterprises generally prioritize local,

organic, and sustainably sourced ingredients to reduce transportation carbon emissions, while guiding consumers to form environmentally friendly dining habits through publicity and education. Dinglan has established a self-built fruit and vegetable base, strictly controlling every link in ingredient procurement and processing to achieve full-process traceability of green ingredients; IHG, on the other hand, directly guides consumers to choose environmentally friendly dining methods by offering vegetarian options and advocating moderate ordering, thereby conveying the concept of a healthy lifestyle.

Regarding guest room products, the selected enterprises strengthen consumers' recognition of the value of green behaviors through the application of eco-friendly products and the promotion of the "green check-in" concept. H World equips guest rooms with plant-fiber slippers and recyclable drinking water bottles to reduce the use of single-use items; Dinglan places environmental reminder cards and adds air purifiers and humidifiers to enhance the guest experience; Zhongshan Xizi Lake designs osmanthus-scented eco-friendly souvenirs in combination with "Song Dynasty cultural heritage," integrating green concepts with regional culture; and Fubang Lijia designs reminder cards with a "low-carbon lifestyle" theme and posts garbage classification posters to promote habit formation across multiple dimensions.

Additionally, leading industry enterprises such as H World and IHG, leveraging their brand influence, have further enhanced their environmental image, conveyed values of social responsibility, and shaped a brand perception that emphasizes both environmental protection and social responsibility. This is achieved

through regularly publishing Sustainability Reports and Corporate Responsibility Reports, participating in the formulation of global hotel sustainability benchmark frameworks, and carrying out public welfare activities such as industrial support and earthquake donations.

3.3.2 Subjective norm-driven green marketing strategies

The green marketing strategies driven by subjective norms primarily encompass environmental policy response, cross-industry collaboration, supplier management and certification, price incentives, environmental labels, and environmental performance rewards. H World drives low-carbon behaviors through multi-dimensional incentives. Its "Green Stay" service stipulates that guests can reduce or waive room fees by selecting breakfast-free and housekeeping-free options via the H World Membership APP (with the option to pay the price difference to restore services if temporarily needed). This not only reduces hotel energy consumption but also guides low-carbon behaviors. By the end of 2023, this service had covered 5,910 stores, cumulatively saving over 674 tons of water. Through price incentives from fee waivers and the social labeling effect of "Green Stay" certification, it creates group pressure to effectively promote environmentally friendly consumption behaviors. In terms of supply chain management, H World implements a strict supplier screening system, with 241 core suppliers currently certified to ISO 14001 Environmental Management System standards, driving environmental friendliness in laundry and linen services. Certification standards are used to establish industry norms that constrain supply chain practices. Additionally, aligning with the government policy requirement to "establish an energy consumption disclosure system," H World participates in formulating the global hotel sustainability benchmark framework, collaborates with NIO to build charging stations, and integrates smart grid systems to optimize power consumption. By leveraging the external regulatory pressure of industry benchmark frameworks, it encourages peers to participate in low-carbon transformation.

IHG centers its strategies on supplier management and collaboration, as well as participation in industry alliances. It sets strict environmental standards and requirements for suppliers, covering compliance with production

processes and sustainable production methods, and conducts regular evaluations and audits. Meanwhile, it collaborates with eco-friendly material suppliers to promote biodegradable disposable items, embedding environmental requirements into all links of the supply chain. Through supply chain governance, it establishes industry norms and social pressure, driving suppliers and partners to jointly adhere to environmental standards. Furthermore, IHG deeply engages in activities of the Global Sustainable Tourism Council (GSTC), sharing green management experiences with international peers and advancing consensus on industry green development through the formulation of industry standards.

The three Hangzhou hotels focus on combining policy response with performance incentives. Dinglan has established a "Green Innovation" leading group, formulated work safety and environmental protection operational specifications, required catering suppliers to obtain ISO 14001 certification, and proactively responded to Hangzhou's "waste sorting" policy, becoming a regional waste sorting demonstration unit. These efforts strengthen compliance through policy response. Zhongshan Xizi Lake and Fubang Lijia have set up "Green Service Star" awards, incorporating environmental performance indicators such as the amount of guest room supplies saved and the implementation rate of waste sorting into employee promotion evaluations. Through performance reward mechanisms, they reinforce individual environmentally friendly behaviors.

3.3.3 Perceived behavioral control-mediated green marketing strategies

The green marketing strategies based on perceived behavioral control primarily encompass digital tools, paperless processes, employee environmental education, and low-carbon-themed activities.

Both H World and IHG have adopted digital tools for real-time energy consumption monitoring. H World utilizes the "Yinenghao" digital platform to monitor energy data, optimize energy-saving solutions, and reduce implementation barriers for conservation measures. Currently, 6,500 stores are integrated with this system. IHG employs advanced energy management systems to analyze real-time hotel energy usage, identify waste points through data analytics, and implement targeted conservation measures. Examples include installing smart

lighting systems that automatically adjust brightness based on room occupancy and natural light intensity, as well as deploying high-efficiency HVAC systems and water-saving fixtures to enhance energy and water resource utilization rates. The application of these systems provides clear operational guidelines and technical support for employees and guests, lowering the difficulty of adopting eco-friendly behaviors and facilitating their participation in the hotels' green operations.

Furthermore, H World simplifies paperless processes through app-based one-click operations, reducing behavioral execution barriers. In 2023, the group issued over 7.77 million electronic invoices, achieving a carbon emission reduction of 118.2 tons. IHG, on the other hand, designs environmental training programs for employees to improve their awareness and skills in sustainability. Training content covers environmental knowledge, energy-saving operational techniques, and waste sorting protocols, enabling employees to better engage in the hotel's green marketing activities and enhancing their proactive compliance with eco-friendly practices.

The three case hotels in Hangzhou focus on technology empowerment and scenario-based design to improve the convenience of eco-friendly behaviors. They employ behavioral guidance and instant reward mechanisms to reduce decision-making costs for employees and consumers participating in green consumption. For instance, Zhongshan Xizi Lake promotes a smart guest room system allowing guests to adjust air conditioning temperatures and lighting via mobile devices for personalized energy conservation. Dinglan organizes low-carbon activities such as "jogging fitness programs" and "weed-removal cycling," linking eco-friendly actions to tangible rewards like complimentary hotel gifts. Fubang Lijia establishes incentive funds for employee energy-saving suggestions, reducing barriers to behavioral implementation.

3.3.4 Case summary

The behavioral attitude-based green marketing strategies adopted by case hotel enterprises exhibit diversification, indicating that domestic and international hotel brands generally prioritize shaping corporate environmental

values, demonstrating environmental commitments, and influencing the environmental attitudes of consumers and stakeholders. The higher a company's market position, the stronger its ability to showcase its brand value and influence market attitudes. However, international and domestic hotels display differing priorities in formulating subjective norm-driven and perceived behavioral control-mediated green marketing strategies. International hotel brands (e.g., IHG) place greater emphasis on policy compliance, primarily advancing industrial synergy and sustainable development through subjective norm-driven strategies and participation in industry standard-setting. Domestic hotel brands (e.g., the three Hangzhou-based hotels) focus more on technological innovation, mainly reducing the difficulty of implementing environmental behaviors through perceived behavioral control-mediated strategies, reflecting that domestic hotels still face certain challenges in implementing environmental policies and fulfilling environmental commitments.

4. Empirical Analysis

4.1 Model Construction

This study employed the analytic hierarchy process (AHP) using yaahp software to construct a hierarchical model for analyzing influencing factors in hotel green marketing strategies. It first identifies the target layer and criterion layer of the model based on relevant literature and case analysis results. The target layer is defined as "optimization of personalized service capabilities in hotel green marketing" while the criterion layer comprises three elements: behavioral attitude, subjective norm, and perceived behavioral control. Subsequently, in combination with the green marketing strategies reflected in the selected cases, the Delphi method was employed to conduct interviews with 10 experts and scholars in related fields (including 3 hotel managers, 4 researchers, and 3 hotel customer representatives), thereby identifying 14 sub-criterion layer strategies in the model (as shown in Table 2).

Table 2. Indicator System for Factors Influencing Hotel Green Marketing Strategies

Target Layer	Criterion Layer	Sub-criterion Layer
Optimization of Personalized	Behavioral Attitude (B1)	Design green and environmentally friendly buildings (C1)
		Innovate green products and services (C2)

Service Capabilities in Hotel Green Marketing (A)		Encourage green consumption habits (C3)
		Foster green corporate culture (C4)
		Disclose corporate green governance information (C5)
	Subjective Norm (B2)	Respond to policy directives (C6)
		Obtain environmental certifications and labels (C7)
		Strictly manage suppliers (C8)
		Implement environmental performance incentives (C9)
		Offer loyalty-based price discounts (C10)
	Perceived Behavioral Control (B3)	Adopt digital tools (C11)
		Install energy-saving facilities (C12)
		Develop paperless office applications (C13)
		Conduct employee training programs (C14)

Source: Compiled by the authors using yaahp12.12.

4.2 Judgment Matrices and Indicator Weights

Based on the established hierarchical model, this study assigned values according to the scale shown in Table 3. Questionnaires are distributed to engage the 10 experts in pairwise comparisons and scoring of the relative importance among elements within the indicator system. Subsequently, the scoring results are

aggregated to compute the comprehensive average value. Finally, using yaahp software, eigenvectors and weight values are calculated to generate the judgment matrix, and a consistency check is performed on the matrix outcomes.

The weight coefficients (ω_i) in the judgment matrix quantify the importance of each element or factor relative to the target layer above or other elements in the same layer. Higher weight values indicate greater importance of the factor.

Table 3 Scale of Importance Meanings

Scale	Meaning
1	The i^{th} factor is equally important as the j^{th} factor.
3	The i^{th} factor is slightly more important than the j^{th} factor.
5	The i^{th} factor is obviously more important than the j^{th} factor.
7	The i^{th} factor is very much more important than the j^{th} factor.
9	The i^{th} factor is extremely more important than the j^{th} factor.
2, 4, 6, 8	Intermediate values between the above adjacent judgments (used for compromise).

Source: Compiled by the authors using yaahp 12.12.

The maximum eigenvalue ($\lambda_{\max}$) of the judgment matrix represents its core eigenvalue under consistency conditions, measuring the logical consistency of the matrix and the rationality of weight allocation. Its value reflects the comprehensive result of the relative importance of elements in the matrix but requires consistency testing to validate its effectiveness. The consistency index (CI) of the judgment matrix reflects the consistency of pairwise comparison results; a smaller CI indicates fewer logical contradictions and more reliable weight allocation; conversely, a larger CI suggests significant inconsistency, requiring adjustment of the judgment matrix.

In the criterion layer judgment matrix (Table 4), the weight of behavioral attitude factors is the

highest at 64.78%, indicating that green marketing strategies aimed at shaping corporate environmental values, demonstrating environmental commitments, and positively influencing stakeholders' evaluations of corporate environmental behaviors have a significant impact.

In contrast, the weights of subjective norm and perceived behavioral control factors are lower at 20.26% and 14.96%, respectively, suggesting that external pressures, expectations, and the difficulty of implementing environmental behaviors, while influential, have relatively smaller effects; among these, external pressures and expectations have a slightly greater influence.

Table 4 Judgment Matrix of the Criterion Layer

Item	B1	B2	B3	ω_i	$\lambda_{\max}$	CI
Behavioral Attitude (B1)	1	3.9000	3.5500	0.6478	3.0396	0.0198
Subjective Norm	0.2564	1	1.6517	0.2026		

(B2)						
Perceived Behavioral Control (B3)	0.2817	0.6054	1	0.1496		

Data Source: Compiled by the authors based on yaahp 12.12 calculations.

Table 5. Judgment Matrix of Behavioral Attitude-Oriented Indicators

Item	C1	C2	C3	C4	C5	ω_i	λ_{max}	CI
Design green and environmentally friendly buildings (C1)	1	0.9917	0.8767	1.3817	2.9200	0.2240	5.1027	0.0257
Innovate green products and services (C2)	1.0084	1	1.4117	1.7700	4.0200	0.2789		
Encourage green consumption habits (C3)	1.1407	0.7084	1	2.3783	4.4833	0.2720		
Foster green corporate culture (C4)	0.7238	0.5650	0.4205	1	4.0000	0.1647		
Disclose corporate green governance information (C5)	0.3425	0.2488	0.2230	0.2500	1	0.0604		

Data Source: Compiled by the authors based on yaahp 12.12 calculations.

As shown in Table 5, the influences of the five behavioral attitude-based strategies are relatively balanced. Among them, "Innovate green products and services," "Encourage green consumption habits," and "Design green and environmentally friendly buildings" have higher weights (27.89%, 27.20%, and 22.40%, respectively), indicating their critical role in shaping corporate environmental values, demonstrating commitments, and reinforcing positive stakeholder attitudes toward corporate environmental behaviors. In contrast, "Foster green corporate culture" and "Disclose corporate green governance information" have lower weights (16.47% and 6.04%), suggesting their influence is less pronounced than the former three.

As shown in Table 6, the influences of the five subjective norm-driven strategies vary significantly. "Respond to policy directives" has the highest weight (47.28%), indicating that policy constraints, guidance, and support are effective in driving corporate environmental behaviors in the current market environment.

"Strictly manage suppliers" and "Obtain environmental certifications and labels" follow (21.70% and 17.88%, respectively), suggesting their influence is notable but less pronounced than policy guidance. "Offer loyalty-based price discounts" (for consumers) and "Implement environmental performance incentives" (for employees) have lower weights (6.65% and 6.50%), indicating their lesser impact compared to the other three factors.

As shown in Table 7, the weights of the four perceived behavioral control-mediated strategies also vary. "Adopt digital tools" and "Install energy-saving facilities" have higher weights (44.09% and 30.79%, respectively), indicating that advanced technology reduces the difficulty of implementing environmental behaviors, enhancing corporate execution and self-efficacy. "Conduct employee training programs" and "Develop paperless office applications" have lower weights (17.72% and 7.4%), suggesting that employee knowledge/skills and office process optimization are not the primary obstacles to implementing green behaviors.

Table 6. Judgment Matrix of Subjective Norm-Oriented Indicators

Item	C6	C7	C8	C9	C10	ω_i	λ_{max}	CI
Respond to policy directives (C6)	1	3.5000	2.7500	5.5000	5.3000	0.4728	5.0864	0.0216
Obtain environmental certifications and labels (C7)	0.2857	1	0.9783	3.0833	2.7500	0.1788		
Strictly manage suppliers (C8)	0.3636	1.0221	1	4.2000	3.9000	0.2170		
Implement environmental performance incentives (C9)	0.1818	0.3243	0.2381	1	1.0500	0.0650		
Offer loyalty-based price discounts (C10)	0.1887	0.3636	0.2564	0.9524	1	0.0665		

Data Source: Compiled by the author based on yaahp 12.12 calculations.

Table 7. Judgment Matrix of Perceived Behavioral Control-Oriented Indicators

Item	C11	C12	C13	C14	ω_i	λ_{max}	CI
Adopt digital tools (C11)	1	2.1000	4.1500	2.4450	0.4409	4.1463	0.0488
Install energy-saving facilities (C12)	0.4762	1	4.0583	2.5867	0.3079		
Develop paperless office applications (C13)	0.2410	0.2464	1	0.2876	0.0740		
Conduct employee training programs (C14)	0.4090	0.3866	3.4884	1	0.1772		

Data Source: Compiled by the author based on yaahp 12.12 calculations.

4.3 Consistency Test

To ensure the objectivity and rational consistency of the judgment matrix, the CR value must be less than 0.10; otherwise, the relative importance of factors must be re-evaluated. The CR value is calculated as:

$$CR = \frac{CI}{RI} \quad (1)$$

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (2)$$

Where:

- CR = Consistency Ratio

- CI = Consistency Index
- RI = Random Consistency Index
- $\lambda_{\max}$ = Maximum eigenvalue of the characteristic equation
- n = Order of the judgment matrix

The consistency test results for the criterion layer and sub-criterion layer judgment matrices are shown in Table 8. All CR values are less than 0.1, indicating that all judgment matrices passed the consistency test. The analysis results can therefore be considered reliable.

Table 8. Consistency Test Results

Judgment Matrix	$\lambda_{\max}$	CI	RI	CR	Consistency Test Result (CR < 0.1, Pass)
Criterion Layer Judgment Matrix	3.0396	0.0198	0.52(n=3)	0.0381	Pass
Behavioral Attitude Judgment Matrix	5.1027	0.0257	1.12(n=5)	0.0229	Pass
Subjective Norm Judgment Matrix	5.0864	0.0216	1.12(n=5)	0.0193	Pass
Perceived Behavioral Control Judgment Matrix	4.1463	0.0488	0.89(n=4)	0.0548	Pass

Data Source: Compiled by the author based on yaahp 12.12 calculations.

4.4 Indicator Weight Ranking

Using the yaahp software, this study constructed a hierarchical model for the factors influencing hotel green marketing strategies and derived the weights of indicators at the criterion and sub-criterion layers, as shown in Table 9.

The influences of the three types of factors at the criteria layer exhibit significant differences, ranked in descending order of weight as follows: behavioral attitude > subjective norm > perceived behavioral control.

Table 9. Indicator Weight Distribution

Criterion Layer	Weight	Sub-criterion Layer	Weight
Behavioral Attitude (B1)	64.78%	Innovate green products and services (C2)	27.89%
		Encourage green consumption habits (C3)	27.20%
		Design green and environmentally friendly buildings (C1)	22.40%
		Foster green corporate culture (C4)	16.47%
		Disclose corporate green governance information (C5)	6.04%
Subjective Norm (B2)	20.26%	Respond to policy directives (C6)	47.28%
		Strictly manage suppliers (C8)	21.70%
		Obtain environmental certifications and labels (C7)	17.88%
		Offer loyalty-based price discounts (C10)	6.65%
		Implement environmental performance incentives (C9)	6.50%
Perceived Behavioral Control (B3)	14.96%	Adopt digital tools (C11)	44.09%
		Install energy-saving facilities (C12)	30.79%
		Conduct employee training programs (C14)	17.72%
		Develop paperless office applications (C13)	7.40%

Data Source: Compiled by the author based on yaahp 12.12 calculations.

The synthetic weight ranking of sub-criterion layer indicators is shown in Table 10. The synthetic weights of sub-criterion layer indicators show that "Innovate green products and services" "Encourage green consumption habits" "Design green and environmentally friendly buildings" and "Foster green corporate culture" (all behavioral attitude-oriented) rank first to fourth. These factors enable hotels to strengthen positive stakeholder evaluations of their environmental behaviors through

innovative green product/service design, guidance of consumer habits, and cultivation of green environments/cultures, providing prerequisites and innovation drivers for green marketing strategies. "Respond to policy directives" "Adopt digital tools" and "Install energy-saving facilities" follow, indicating that policy support and advanced technology reduce implementation barriers and drive environmental behaviors, offering external guarantees and technical support for green

marketing strategies. Additionally, "Strictly manage suppliers" "Disclose corporate green governance information" and "Obtain environmental certifications and labels" allow hotels to leverage brand influence, enhancing motivation and external constraints for green behaviors, thereby providing resource guarantees and differentiated competitive

advantages. Other factors, such as "Conduct employee training programs" "Offer loyalty-based price discounts" "Implement environmental performance incentives" and "Develop paperless office applications" also drive green marketing strategies to some extent but with limited impact.

Table 10. Synthetic Weight Ranking

Rank	Indicator Code	Indicator Name	Synthetic Weight
1	C2	Innovate green products and services	18.07%
2	C3	Encourage green consumption habits	17.62%
3	C1	Design green and environmentally friendly buildings	14.51%
4	C4	Foster green corporate culture	10.67%
5	C6	Respond to policy directives	9.58%
6	C11	Adopt digital tools	6.60%
7	C12	Install energy-saving facilities	4.61%
8	C8	Strictly manage suppliers	4.40%
9	C5	Disclose corporate green governance information	3.91%
10	C7	Obtain environmental certifications and labels	3.62%
11	C14	Conduct employee training programs	2.65%
12	C10	Offer loyalty-based price discounts	1.35%
13	C9	Implement environmental performance incentives	1.32%
14	C13	Develop paperless office applications	1.11%

Data Source: Compiled by the author based on yaahp 12.12 calculations.

5. Optimization Recommendations

The green marketing strategies of hotels and their capability for personalized service delivery exhibit multidimensional synergies and complementary relationships. Based on case analyses and survey results, the optimization of personalized service capabilities can be structured across six dimensions.

5.1 Immersive Integration of Sustainable Experiences

Green product and service innovation serves as the core lever for hotel green marketing. Hotels must transform environmental elements into perceptible customer experience value, achieving dual enhancements in environmental benefits and service differentiation. Specific approaches include contextual application of eco-friendly materials and modular carbon offset design. For example, Shanghai Bund W Hotel collaborated with artists on the "Sustainable Art Project," converting recycled glass bottles into art installations with QR codes tracing production processes, thereby enhancing guests' intuitive understanding of environmental value. Accor Group's loyalty program incorporates mechanisms such as 50 points/reuse of linens, 20 points/electronic

billing, and 100 points/participation in cleaning activities. This system increased member repurchase rates by 21% while reducing average hotel energy consumption by 6.3%.

5.2 Data-Driven Precision Service Design

Customer green consumption habits significantly influence hotel green marketing strategies. Integrating green behavioral and preference data enables precise analysis of consumption patterns, constructing sustainable personalized service models. Hotels can implement IoT-enabled real-time monitoring of room energy consumption, linen usage, and behavioral data (e.g., occupancy frequency) to build dynamic carbon footprint profiles for lifecycle carbon tracking. In addition, they can also apply natural language processing to analyze eco-keywords (e.g., "recyclable," "low-carbon") in guest reviews, establishing green preference tagging systems. Horwath HTL's 2023 China Hotel Industry Guest Loyalty Report indicates eco-labeling enhances repurchase rates by 12-18% in luxury hotels.

5.3 Technology-Enabled Dynamic Service Optimization

Digital tools and energy-efficient facilities form critical support systems for green marketing.

AI-driven dynamic energy management systems (e.g., Hangzhou Huanglong Hotel's "Smart Room Brain" using infrared sensing and machine learning) automatically switch to energy-saving modes upon guest departure, achieving 2.1-2.3 kWh/day savings per room and 40% faster service response. Blockchain applications tracking local ingredients' full carbon footprint (farm-to-table) via blockchain platforms enable customers to scan QR codes for verification, increasing customized menu selection rates by 18% and reducing transportation emissions by 12%.

5.4 Upgraded Organizational Capability Coupling

Employee training and incentive systems constitute foundational pillars. For example, Shangri-La Group's Sustainable Service Operations Manual integrates environmental requirements with guest experience management, achieving 23% water conservation at Beijing China World Hotel. Four Seasons Hotels' "Green Ambassador Program" mandates sustainability training (including LEED certification for some roles), with pilot hotels reporting 32% higher guest participation in energy-saving initiatives through employee-designed reward mechanisms.

5.5 Dynamic Value Co-Creation Mechanism

Localized eco-initiatives can enhance guests' self-efficacy in environmental participation. UGC-driven green travel communities such as H World's "Green Traveler" platform saw monthly interactions (comments + shares) surge from 120,000 in 2021 to 384,000 in 2022, providing innovation insights for sustainable services. Gamified eco-tasks such as "Eco Quest" challenges (e.g., waste sorting, low-carbon commuting) with hidden rewards increased engagement duration by 45% and elevated ancillary dining spending by 17%.

5.6 Adaptive Conflict Resolution Mechanisms

A tiered service framework balances environmental constraints with personalization. For example, Jinling Hotel's 2022 Sustainability Report proposes a "Service Layering Model," distinguishing mandatory eco-standards (water-saving fixtures) from optional upgrades (organic cotton bedding). Besides, AI emotion recognition systems adjust service protocols in real time. When detecting guest resistance to

eco-policies, automated compensation (e.g., room upgrades) improves acceptance rates by 28%.

In summary, the synergy between green marketing and personalized services fundamentally redefines value creation through technological innovation, transforming environmental constraints into experiential opportunities. Validated by leading hotel groups, the core mechanism lies in establishing a dynamic equilibrium among environmental benefits, customer value, and operational efficiency. Future advancements in carbon accounting technologies and heightened consumer environmental awareness will further position sustainable personalized services as a critical competitive differentiator. Industry-wide collaboration on green service databases and knowledge-sharing networks will accelerate iterative innovation, collectively advancing high-quality development trajectories.

6. Conclusion

6.1 Research Findings

This research, based on the Theory of Planned Behavior (TPB), systematically explored the influence mechanism of hotels' green marketing strategies on personalized service capabilities through case analysis and empirical research. Key findings are as follows.

- The three dimensions of TPB have differential driving effects on hotels' personalized service capabilities. Behavioral attitude (weight: 64.78%) is the dominant driver, followed by subjective norm (20.26%) and perceived behavioral control (14.96%).
- Core drivers for green marketing strategies based on behavioral attitude include green product innovation (27.89%), encouragement of green consumption habits (27.20%), and green building design (22.40%).
- Policy response (47.28%) is the most impactful factor among green marketing strategies driven by subjective norm.
- Application of digital tools (44.09%) is critical for enhancing perceived behavioral control.

This study confirms that hotels can achieve synergistic effects between green marketing and personalized services by establishing a dynamic balance mechanism among "environmental benefits, customer value, and operational efficiency."

From a practical perspective, this study identifies three optimization directions for hotel personalized services. The first is to enhance service value-added through immersive experience integration, such as converting eco-friendly materials into perceptible guest room designs or developing carbon offset point systems. The second is to design precision services driven by data, leveraging IoT and AI technologies to build customer carbon footprint profiles and dynamically adapt personalized services to green behaviors. The third is to strengthen dynamic adjustment mechanisms enabled by technology, using blockchain to enhance service credibility and modular service design to balance environmental constraints with personalized needs.

6.2 Research Limitations and Outlook

This research has three main limitations. First, case selection focused on chain brands in eastern China, limiting generalizability to independent hotels and western regions. Second, it did not deeply explore the heterogeneity of green consumption preferences among Generation Z and other new consumer groups. Third, emerging issues such as AI algorithm ethics and carbon footprint accounting standards were not addressed.

Future research can expand in three directions. The first is to develop cross-cultural comparative models by analyzing the evolution paths of green marketing strategies under different institutional environments. The second is to further explore green behavior patterns from unstructured data (e.g., customer reviews, service logs) collected by machine learning applications. The third is to investigate the application potential of Web3.0 technologies (e.g., DAO organizations, digital twins) in green service innovation, promoting the transformation of the hotel industry toward a “carbon neutrality + metaverse” composite service ecosystem.

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