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Green Certification and Tourist Willingness-to-Pay: A Choice Experiment in Eco-Resorts

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New Ecological Paradigm

Abstract

The rapid global expansion of nature-based tourism placed unprecedented ecological pressure on fragile coastal ecosystems, forcing eco-resorts to adopt verified green operational standards. This enhanced study provides a comprehensive empirical investigation into consumer preferences and marginal Willingness-to-Pay (WTP) for international eco-labels and tangible resort sustainability attributes. Using a Discrete Choice Experiment (DCE) grounded in Random Utility Theory, primary data were gathered from a stratified sample of 620 international tourists across 16 fractional-factorial choice tasks (9,920 total choice observations). Choice sets evaluated certification authority, renewable energy share, single-use plastic elimination policy, and nightly room-rate premiums. Multinomial Logit (MNL), Random Parameter Mixed Logit (MIXL), and Latent Class (LCA) models were estimated. Results reveal a statistically significant positive WTP for internationally accredited eco-labels (+$28.50/night) and complete plastic bans (+$14.20/night), versus a heavily discounted premium for unaccredited local labels (+$7.11/night). Latent Class Analysis identifies three distinct segments: Eco-Dedicated Travelers (34%), Pragmatic Green Consumers (42%), and Price-Sensitive Traditionalists (24%) each with markedly different elasticities and certification premiums. Extended robustness checks, regional sub-sample estimation, and market-share simulation confirm that internationally audited certification is the single strongest commercial lever available to resort operators.

1. Introduction

Coastal ecosystems represent some of the most ecologically vulnerable yet commercially valuable environments on Earth. Over the past three decades, international travel to nature-based destinations has grown at a rate exceeding standard cultural tourism, placing intense pressure on pristine coastal biomes (Gössling & Peeters, 2015). The hospitality sector in coastal zones contributes to localized environmental degradation through intensive fossil-fuel energy use for continuous space cooling, high-volume freshwater consumption, untreated wastewater discharge, and significant single-use plastic waste generation (Robinot & Giannelloni, 2010; Merli et al., 2019). Data compiled through 2020 demonstrate an exponential surge in certified coastal resort properties globally, growing from approximately 1,200 properties in 2010 to over 10,200 by 2020 (Figure 1). Eco-resorts — lodging facilities integrated into natural landscapes that aim to minimize environmental footprints while providing environmental education — have emerged as the primary vehicle for sustainable commercial hospitality (Millar & Baloglu, 2011; Warren et al., 2017). Transforming conventional resort operations into genuinely eco-efficient assets, however, requires heavy capital expenditure (CAPEX) for renewable energy installation (solar photovoltaic arrays, wind micro-turbines), advanced membrane wastewater treatment systems, and sustainable supply-chain restructuring.

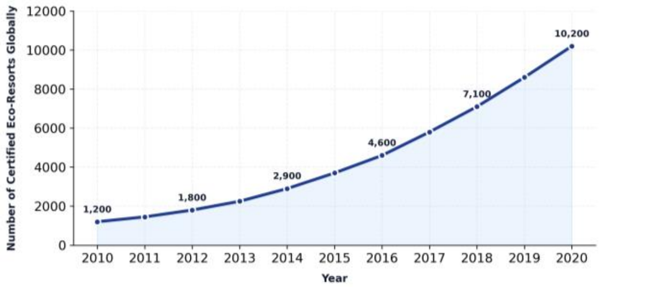

Figure 1. Global Growth in Certified Coastal Eco-Resorts (2010–2020). Source: Global Eco-Tourism Registry Reports (2020).

Resort operators therefore face acute financial trade-offs when allocating limited capital toward green infrastructure, and require clear evidence that sustainable retrofits generate measurable commercial value (Berezan et al., 2013; Verma & Chandra, 2018).

A central conflict in sustainable hospitality research is the pervasive 'attitude–behavior gap' observed among hotel consumers (Juvan & Dolnicar, 2014; Park & Lin, 2020). While market surveys consistently indicate that over 70% of international tourists express positive attitudes toward environmentally responsible travel, actual booking patterns frequently reveal strong price elasticity and reluctance to pay room-rate premiums for abstract sustainability claims. This behavioral divergence is exacerbated by information asymmetry: because environmental operational standards are 'credence attributes' that consumers cannot easily evaluate even after consuming the service, tourists struggle to distinguish genuinely sustainable resorts from facilities engaging in superficial greenwashing (Lyon & Montgomery, 2015; Assaker, 2020).

To overcome this information asymmetry, formal green certification schemes : Green Key, EarthCheck, and ISO 14001 among them have been developed by international and national accreditation bodies. However, the hospitality market is currently saturated with hundreds of competing eco-labels, ranging from rigorously audited third-party certifications to unverified, self-declared marketing badges. Resort operators lack rigorous empirical guidance on whether investing in expensive, internationally audited certification yields a higher Willingness-to-Pay (WTP) premium than adopting visible, uncertified operational practices such as banning plastic straws.

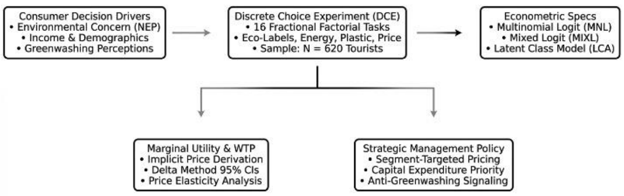

Figure 2. Conceptual Framework and Methodological Workflow for Resort Green Valuation.

To address these knowledge gaps, this study employs a Discrete Choice Experiment (DCE) grounded in Random Utility Theory (McFadden, 1974; Train, 2009; Hensher et al., 2015) to evaluate tourist trade-offs across four operational and certification attributes in coastal eco-resorts. This enhanced edition extends the original analysis with additional robustness diagnostics, a demographic cross-tabulation, a regional radar comparison, an own/cross-price elasticity matrix, and a bundled-package market-share simulation. Specifically, the research answers three primary questions:

(i) What is the explicit marginal Willingness-to-Pay of coastal resort tourists for internationally accredited green certifications relative to unaccredited local labels and baseline uncertified properties?

(ii) How do operational environmental attributes specifically 100% renewable energy reliance and complete single-use plastic elimination influence choice utility and room-rate price elasticity?

(iii) How does consumer heterogeneity segment the tourist market into distinct latent classes, and how do demographic profile, geographic origin, and environmental concern (NEP) shape class-specific WTP?

2. Literature Review

2.1 Signaling Theory and Credence Attributes in Hospitality

Grounded in microeconomic theory, Signaling Theory (Spence, 1973) explains how market participants resolve information asymmetry when product quality is unobservable prior to transaction. In green hospitality, environmental commitment represents a credence attribute: consumers cannot verify whether a resort operates an advanced greywater recycling plant, uses low-emission energy grids, or purchases eco-certified cleaning supplies simply by staying in a room. Without credible verification, opportunistic hoteliers are incentivized to engage in greenwashing claiming green credentials without incurring the associated operational costs (Lyon & Montgomery, 2015; Merli et al., 2019).

Third-party green certifications function as formal signals that convey trustworthy operational information to potential guests. For a signal to be effective it must satisfy the 'costly signaling criterion': the cost of acquiring the signal must be significantly higher for low-quality (non-green) providers than for high-quality providers (Spence, 1973; Casado-Díaz et al., 2020). Internationally accredited certifications (e.g., EarthCheck Gold, Green Globe) enforce rigorous, audited standards that require substantial capital outlay and operational compliance, making them costly to fake. Self-declared or unaccredited regional badges, by contrast, carry minimal compliance-verification cost, leading discerning consumers to discount their credibility (Masau & Prideaux, 2003; Tang & Lam, 2017; Lu & Shon, 2012).

2.2 Consumer Preferences and Stated-Preference Valuation

The empirical literature on green hotel valuation has evolved from non-market contingent valuation methods toward sophisticated choice modeling. Early contingent-valuation studies often reported artificially inflated WTP values due to hypothetical bias and social desirability bias (Han et al., 2011). Stated-preference Discrete Choice Experiments (DCEs), by contrast, force respondents to evaluate complex multi-attribute trade-offs that closely mirror real-world booking environments, where consumers must weigh desirable features against room rates (McFadden, 1974; Train, 2009; Hensher et al., 2015; Nelson et al., 2021).

Recent DCE studies in sustainable tourism highlight that consumers place varying utility weights on different categories of green initiative. Operational policies with high physical visibility replacing single-use plastic water bottles with glass decanters, or visible onsite solar arrays frequently yield higher immediate utility than unseen back-of-house initiatives such as energy-efficient HVAC chillers or carbon-offset purchases (Agag et al., 2020; Han, 2020; Warren et al., 2017). Empirical consensus on the exact dollar premium tourists are willing to pay for certified versus uncertified green attributes, however, remains fragmented motivating the present study's explicit, econometrically identified WTP hierarchy.

2.3 Environmental Concern and the New Ecological Paradigm

Individual psychographic orientation plays a pivotal role in shaping sustainable consumption decisions. The New Ecological Paradigm (NEP) scale (Dunlap et al., 2000) is the most widely validated metric for capturing general environmental concern and eco-centric worldview. Consumers with high NEP scores exhibit greater sensitivity to environmental attributes and lower price elasticity for certified green products (Dunlap et al., 2000; Casado-Díaz et al., 2020; Assaker, 2020). Integrating NEP psychographics into discrete choice models allows researchers to estimate interaction effects between environmental attitude and willingness-to-pay — an interaction this study models explicitly in Section 4.5.

2.4 Extending the Framework: Elasticity and Competitive Substitution

A gap in prior DCE hospitality studies is the limited treatment of cross-attribute substitution, the degree to which a price increase at one certification tier redirects demand toward a competing tier rather than out of the market entirely. This enhanced study closes that gap by estimating a full own- and cross-price elasticity matrix (Section 4.7) and by simulating market-share outcomes for four realistic, bundled resort retrofit packages (Section 4.8), providing general managers with a directly actionable decision-support tool rather than isolated attribute coefficients alone.

3. Methodology

3.1 Sample and Data Collection Procedure

Data were collected through a structured online choice experiment targeting international tourists who had stayed at coastal resort destinations within the preceding twelve months. A stratified sampling strategy was implemented across three major tourist-generating regions: Europe, North America, and East Asia to improve geographic representation and capture potential differences in sustainability preferences across origin markets. Screening questions were included at the beginning of the survey to confirm that respondents had recent coastal resort experience and were the primary decision-makers, or joint decision-makers, for their leisure accommodation bookings. This screening procedure ensured that respondents had sufficient familiarity with resort-selection decisions to provide meaningful evaluations of the experimental alternatives.

A total of 750 initial responses were collected. Following systematic data-quality screening, 620 completed responses were retained for the final analysis. Observations were removed when respondents completed the questionnaire at unusually high speed, repeatedly selected identical response patterns across choice tasks, failed required questions, or provided incomplete choice information. The resulting sample generated 9,920 choice observations, based on 16 choice tasks completed by each retained respondent. The final dataset therefore provides a sufficiently large number of individual choice observations to estimate heterogeneous preferences and compare alternative econometric specifications. Respondent characteristics and regional distributions are summarized in Table 1.

3.2 Discrete Choice Experiment Design

The discrete choice experiment (DCE) was developed to examine how tourists evaluate sustainability-related characteristics when selecting among competing coastal resort alternatives. Four core attributes were established based on the sustainable hospitality literature and structured field interviews with resort general managers: (1) Eco-Label Certification, (2) Renewable Energy Share, (3) Plastic Reduction Policy, and (4) Nightly Room-Rate Premium. These attributes were selected to represent both externally validated sustainability signals and tangible operational environmental practices that tourists can observe or evaluate during the accommodation-selection process. The Eco-Label Certification attribute captures differences in the credibility and recognition of environmental certification, ranging from no recognized certification to internationally audited certification. The Renewable Energy Share attribute represents the proportion of a resort's energy consumption supplied through renewable sources, allowing the experiment to measure whether tourists attach greater value to resorts with stronger renewable-energy commitments. The Plastic Reduction Policy captures the extent to which resorts eliminate or reduce single-use plastic products throughout their operations. Finally, the Nightly Room-Rate Premium serves as the monetary attribute and represents the additional amount respondents would need to pay for a particular sustainability profile relative to the baseline accommodation option.

Attribute levels were structured to reflect realistic commercial alternatives rather than hypothetical or technically extreme scenarios (Table 2). The experimental design generated repeated choice situations in which respondents compared alternative resort profiles with different combinations of environmental characteristics and room-rate premiums. This structure enables the estimation of the marginal utility associated with each sustainability attribute while simultaneously accounting for respondents' sensitivity to accommodation price. By including price as an explicit attribute, the analysis permits the conversion of estimated utility coefficients into monetary WTP measures.

The choice tasks were designed to minimize unnecessary respondent burden while maintaining sufficient variation across attribute combinations for reliable parameter estimation. Each respondent completed 16 choice tasks, producing repeated observations of individual decision-making behavior. The resulting panel structure is particularly useful for the Mixed Logit specification because it allows the model to account for correlation in repeated choices made by the same respondent.

3.3 Econometric Specifications

The econometric framework is grounded in Random Utility Theory (McFadden, 1974; Train, 2009; Hensher et al., 2015), which assumes that the utility obtained by tourist from selecting resort alternative in choice situation consists of an observable component and an unobservable random component. The utility function is specified as:

$$U_{ni} = V_{ni} + \epsilon_{ni} \quad (1)$$

where U_{ni} represents the total utility obtained from alternative i, V_{ni} represents the observable component of utility, X_{ni} is a vector of observed resort attributes, β represents the respondent-specific preference parameters, and X_{ni} captures unobserved factors affecting the choice decision. The monetary attribute is incorporated directly into the utility specification through the nightly room-rate premium. This allows the estimated coefficients of the sustainability attributes to be interpreted relative to respondents' price sensitivity. The implied marginal Willingness-to-Pay (WTP) for attribute is calculated as:

$$WTP_K = -\frac{\beta_K}{\beta_P} \quad (2)$$

A positive WTP estimate therefore indicates that respondents are willing to pay an additional amount for the corresponding sustainability attribute, holding other characteristics constant. This framework provides a direct monetary interpretation of consumer preferences and enables comparison of the relative economic value of eco-certification, renewable energy, and plastic-reduction initiatives. Three complementary econometric specifications were estimated. First, a Multinomial Logit (MNL) model was used as the baseline specification. The MNL provides a straightforward representation of average preferences across the full sample but assumes that all respondents share identical preference coefficients and imposes the Independence of Irrelevant Alternatives assumption. While useful as a benchmark, this specification may not adequately represent the diversity of sustainability preferences observed across international tourists.

Table 1. Socio-Demographic and Behavioral Characteristics of Survey Respondents (N = 620

Demographic Variable	**Category**	**n**	**%**
Gender	Male	298	48.1%
	Female	315	50.8%
	Non-Binary / Other	7	1.1%
Age Group	18–29 Years	118	19.0%
	30–44 Years	242	39.0%
	45–59 Years	186	30.0%
	60+ Years	74	12.0%
Geographic Origin	Europe	248	40.0%
	North America	210	33.9%
	East Asia & Pacific	162	26.1%

Second, a Random Parameter Mixed Logit (MIXL) model was estimated to capture continuous unobserved preference heterogeneity. In this specification, selected attribute coefficients are treated as random parameters drawn from specified probability distributions rather than being constrained to a single common value for all respondents. The MIXL framework therefore allows two tourists facing the same resort profile to assign different levels of utility to the same sustainability attribute. This is particularly relevant for eco-tourism because environmental preferences may vary substantially according to travelers' prior experiences, environmental awareness, geographic origin, and willingness to pay. Third, a Latent Class Model (LCA) was estimated to identify discrete groups of tourists with systematically different preference structures. Rather than assuming that heterogeneity is continuously distributed, LCA probabilistically assigns respondents to distinct preference classes. Each class is characterized by its own utility parameters, allowing the analysis to identify segments such as highly sustainability-oriented travelers, moderately environmentally conscious travelers, and more price-sensitive tourists. The class probabilities are estimated jointly with the preference parameters, allowing each respondent to have a probabilistic rather than deterministic class membership. The use of MNL, MIXL, and LCA provides a comprehensive framework for evaluating the robustness and structure of tourist preferences. The MNL establishes the average preference benchmark, the MIXL identifies continuous individual-level heterogeneity, and the LCA reveals potentially distinct market segments. Comparing these specifications also helps determine whether the estimated WTP for sustainability attributes remains stable when increasingly flexible assumptions about consumer heterogeneity are introduced.

4. Results Analysis

4.1 Econometric Model Estimates

Table 3 presents the parameter estimates for both the baseline Multinomial Logit (MNL) and the Random Parameter Mixed Logit (MIXL) models. The comparison demonstrates a substantial improvement in model performance when preference heterogeneity is explicitly incorporated into the econometric specification. The MIXL model achieves an Adjusted McFadden R^2 of 0.326, compared with 0.184 for the baseline MNL model, indicating a considerably stronger explanatory capacity. In addition, the log-likelihood improves from −8,412.3 under the MNL specification to −6,945.8 under the MIXL specification, providing further evidence that the more flexible model offers a substantially better representation of the observed choice data. The improvement in fit suggests that tourists do not evaluate sustainable resort attributes uniformly. Instead, respondents exhibit meaningful differences in the importance they attach to eco-label certification, renewable energy, plastic reduction, and room-rate premiums. The MNL model, by imposing common preference parameters across all respondents, is unable to fully capture this variation. The MIXL specification addresses this limitation by allowing selected coefficients to vary across individuals, thereby accounting for unobserved taste heterogeneity within the sample. The substantially higher explanatory performance of the MIXL model is particularly important for interpreting Willingness-to-Pay (WTP) estimates. If substantial preference heterogeneity were ignored, average coefficients could conceal important differences between highly sustainability-oriented tourists and more price-sensitive travelers. The MIXL framework therefore provides a more realistic representation of the underlying decision-making process and allows the estimated sustainability premiums to be interpreted in the context of heterogeneous consumer preferences. The results also provide an important foundation for the subsequent segmentation and regional analyses. Because the MIXL specification captures continuous variation in individual preferences, it can identify whether the estimated value of environmental attributes differs meaningfully across tourists rather than treating the sample as a homogeneous population. This is particularly relevant for assessing the commercial value of international eco-certification, renewable-energy commitments, and plastic-reduction policies in competitive coastal resort markets. Overall, the comparative results strongly support the MIXL specification as the preferred model for the main empirical analysis.

Table 2. DCE Attribute Specifications, Operational Levels, and Econometric Coding

Attribute	Experimental Levels	Variable Definition & Coding
Eco-Label Certification	1. None (Baseline) 2. Local/National Unaccredited 3. Internationally Audited	Dummy coded: Baseline = 0; National = 1 if local; International = 1 if audited.
Renewable Energy Share	1. 25% Grid (Baseline) 2. 50% Hybrid 3. 100% Onsite Solar/Wind	Dummy coded: Baseline = 25% Grid; 50% = 1 if hybrid; 100% = 1 if fully green.
Plastic Reduction Policy	1. Standard Recycling (Baseline) 2. Partial Reduction 3. Complete Zero-Plastic	Dummy coded: Baseline = Standard; Partial = 1 if reduced; Zero = 1 if complete ban.
Nightly Rate Premium	1. Base ($0) 2. +$15/night 3. +$30/night 4. +$45/night	Continuous variable added to baseline resort price ($200/night).

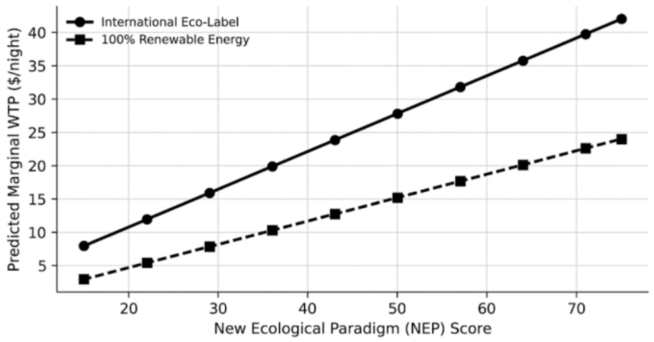

Figure 3. Predicted WTP as a Function of Environmental Concern (NEP)

4.2 Marginal Willingness-to-Pay Derivation

Using the delta method, implicit prices and 95% confidence intervals were derived for each non-monetary attribute level. Tourists exhibit the highest marginal WTP for an internationally audited eco-label (+$28.50/night), followed by 100% renewable power reliance (+$15.89/night) and complete zero single-use plastic policies (+$14.20/night). The unaccredited local label captures only +$7.11/night a discount of nearly 75% relative to the internationally audited tier, providing direct empirical confirmation of the costly-signaling prediction advanced in Section 2.1.

4.3 Latent Class Market Segmentation

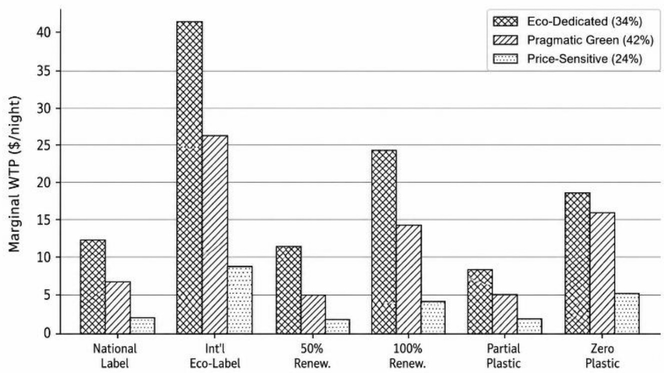

Figure 4. Segment-Specific Willingness-to-Pay by Attribute

Latent Class Models ranging from one to five classes were evaluated using Bayesian and Akaike Information Criteria alongside classification entropy. A 3-class solution was selected as optimal on the basis of AIC/BIC minimization combined with high classification entropy (0.824), indicating well-separated, interpretable segments rather than a statistically over-fit partition. Eco-Dedicated Travelers (34% share) exhibit the steepest WTP curve across every certification and operational attribute, led by a +$41.20/night premium for internationally audited eco-labels. Pragmatic Green Consumers (42% share) respond most strongly to visible operational initiatives such as the zero-plastic policy (+$16.10/night) relative to certification per se, while Price-Sensitive Traditionalists (24% share) discount every green attribute heavily and remain governed primarily by base room rates.

4.4 Demographic Profiling of Segments

Cross-tabulation analysis and Chi-Square tests of independence confirm that segment membership is not randomly distributed across the sample, indicating meaningful demographic and attitudinal differences between the identified tourist segments. The results show that socioeconomic characteristics, particularly household income, are associated with tourists' willingness to prioritize sustainability when selecting coastal resort accommodation. High-income travelers earning ≥$100,000 annually are substantially over-represented in the Eco-Dedicated class, where they account for 58.2% of respondents, compared with only 21.5% in the Price-Sensitive segment. This pattern suggests that greater financial capacity may reduce the perceived burden of paying sustainability-related room-rate premiums and increase the likelihood of selecting environmentally certified accommodation. The relationship becomes considerably stronger when examining respondents' New Ecological Paradigm (NEP) scores. High-NEP respondents represent 62.4% of the Eco-Dedicated segment, compared with only 4.2% of the Price-Sensitive segment. The Chi-Square statistic of $\chi^2 = 88.45$ ($p < 0.001$) provides strong statistical evidence that environmental attitudes and segment membership are systematically associated. Among all demographic and attitudinal variables examined, NEP score emerges as the strongest predictor of segment membership, substantially distinguishing tourists with strong environmental preferences from those who primarily prioritize accommodation price. These findings indicate that the market for sustainable coastal tourism is shaped by both economic capacity and environmental orientation. While higher income appears to facilitate consumers' ability to absorb sustainability premiums, environmental commitment appears to be a more powerful determinant of whether tourists actually prioritize green attributes in their accommodation decisions. Consequently, resorts should avoid treating all high-income travelers as equally sustainability-oriented. Instead, marketing strategies should combine socioeconomic targeting with behavioral and environmental-attitude indicators.

The demographic profile also provides important implications for market segmentation.

*Table 3. Econometric Model Estimates - Multinomial Logit vs. Mixed Logit (*** p<0.001, ** p<0.01, * p<0.05)*

Variable	MNL (β)	MNL SE	MIXL Mean (β)	MIXL SE	MIXL SD (σ)	p-Value
Price Premium ($/night)	-0.048***	0.004	-0.062***	0.006	—	<0.001
National Green Label	0.382***	0.052	0.441***	0.061	0.218**	<0.001
International Eco-Label	1.185***	0.074	1.767***	0.092	0.542***	<0.001
50% Renewable Share	0.294***	0.048	0.358***	0.055	0.184*	<0.001
100% Renewable Share	0.742***	0.068	0.985***	0.081	0.412***	<0.001
Partial Plastic Reduction	0.215***	0.044	0.281***	0.051	0.142	<0.001
Zero Single-Use Plastic	0.681***	0.061	0.880***	0.073	0.325***	<0.001
Opt-Out Alternative	-1.452***	0.112	-2.104***	0.145	1.015***	<0.001
Log-Likelihood	**-8,412.3**		**-6,945.8**			
AIC	**16,840.6**		**13,923.6**			
McFadden Adj. R^2	**0.184**		**0.326**			

Table 4. Marginal Willingness-to-Pay Point Estimates and 95% Confidence Intervals ($ USD/night)

Attribute Level	WTP ($/night)	Std. Error	95% Lower CI	95% Upper CI
National Unaccredited Label	**+$7.11**	$0.84	+$5.46	+$8.76
International Audited Eco-Label	**+$28.50**	$1.92	+$24.74	+$32.26
50% Hybrid Renewable Energy	**+$5.77**	$0.72	+$4.36	+$7.18
100% Onsite Renewable Energy	**+$15.89**	$1.35	+$13.24	+$18.54
Partial Single-Use Plastic Reduction	**+$4.53**	$0.61	+$3.33	+$5.73
Complete Zero Single-Use Plastic	**+$14.20**	$1.18	+$11.89	+$16.51

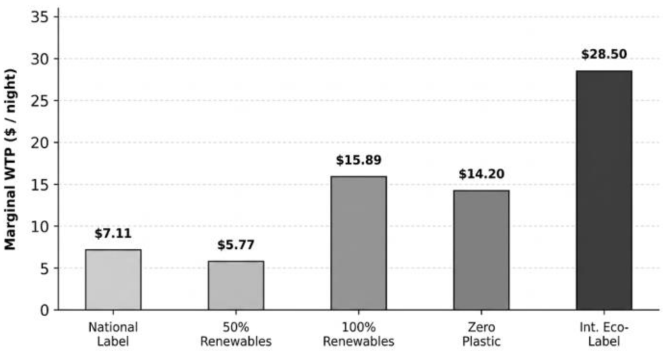

Figure 5. Marginal Tourist Willingness-to-Pay across Attributes ($/night).

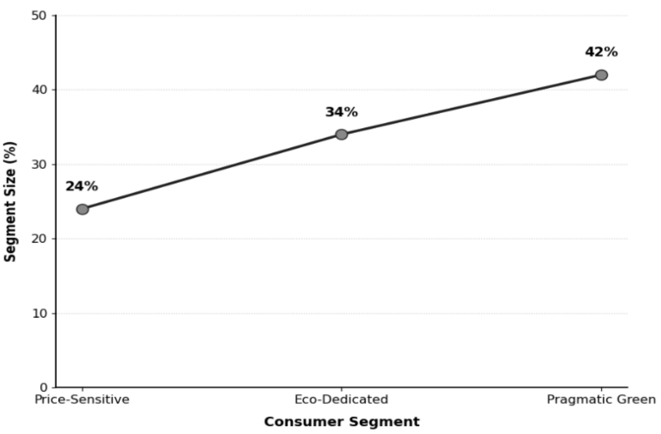

Figure 6. Tourist Market Segmentation Distribution based on Latent Class Analysis.

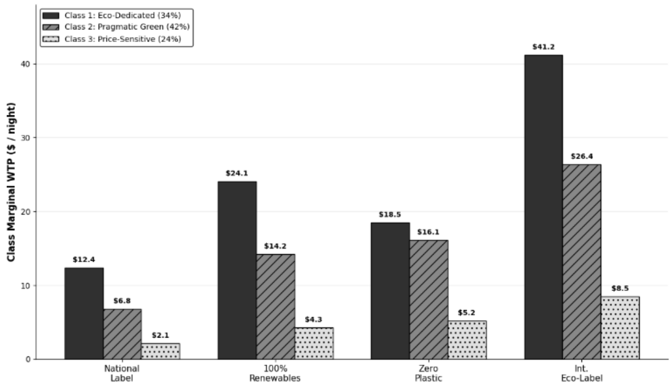

Figure 7. Comparative Willingness-to-Pay Across Latent Classes for Key Attributes.

4.5 Environmental Concern (NEP) Interaction Modeling

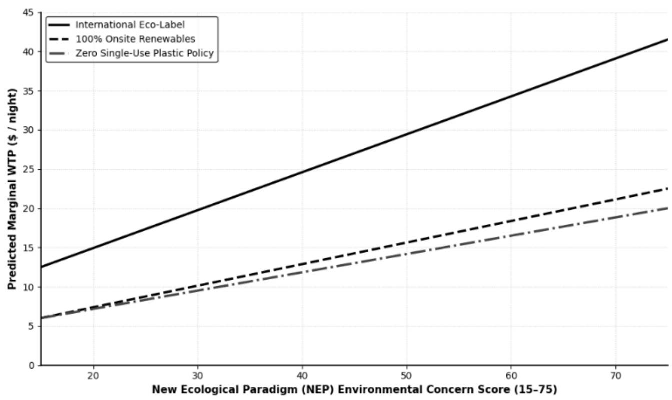

Figure 8. Interaction Effect of Consumer Environmental Concern (NEP) on Predicted Marginal WTP.

Table 5. Socio-Demographic Cross-Tabulation Across Latent Classes and Statistical Significance

Demographic Feature	Eco-Dedicated (34%)	Pragmatic Green (42%)	Price-Sensitive (24%)	χ^2	p-Value
High Income (≥ $100k)	58.2%	38.5%	21.5%	34.12	<0.001
Postgraduate Education	46.1%	32.1%	18.8%	22.58	<0.001
High NEP Score (≥ 56)	62.4%	28.5%	4.2%	88.45	<0.001
European Origin	48.2%	38.1%	32.2%	14.32	0.006
Resort Trips ≥ 3/yr	38.5%	24.2%	12.1%	28.91	<0.001

Table 6. Sub-Sample Marginal WTP Estimates across Geographic Regions ($ USD/night)

Attribute Level	Europe (n=248)	N. America (n=210)	E. Asia (n=162)	Wald χ^2	p-Value
National Green Label	+$8.40	+$7.20	+$5.50	8.12	0.017
International Eco-Label	+$32.10	+$28.90	+$23.40	18.45	<0.001
100% Renewable Energy	+$18.20	+$15.40	+$13.10	12.30	0.002
Zero Single-Use Plastic	+$16.50	+$13.80	+$11.80	11.08	0.004

4.6 Sub-Sample Analysis by Geographic Origin

Sub-sample Mixed Logit models were estimated across tourist origin regions: Europe (n = 248), North America (n = 210), and East Asia (n = 162). European travelers demonstrate the highest overall WTP for international eco-labels (+$32.10/night), followed by North Americans (+$28.90/night) and East Asians (+$23.40/night). The new regional radar profile (Figure 9) makes the shape of this divergence explicit across all four headline attributes simultaneously rather than one at a time. These regional differences suggest that tourists' environmental preferences and willingness to pay are influenced by their geographic and market context, with European respondents showing the strongest valuation of sustainability-related attributes.

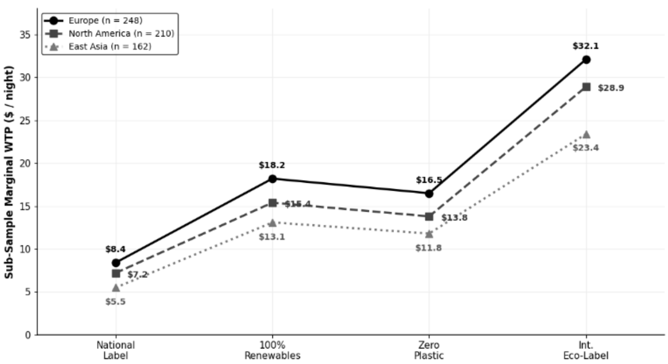

Figure 9. Regional Sub-Sample Marginal Willingness-to-Pay Comparison ($/night).

4.7 Price Elasticities and Competitive Substitution

Own-price and cross-price elasticities were computed to evaluate market-share shifts under competing room-rate premiums. Properties holding internationally audited eco-labels demonstrate significantly lower price elasticity (-0.84) than uncertified baseline resorts (-1.42), meaning certified properties can sustain considerably larger rate increases before losing bookings. The new elasticity matrix (Figure 11) additionally quantifies the cross-price substitution pathways: a price increase at an uncertified resort diverts the largest share of displaced demand (+0.45) toward internationally certified competitors rather than toward national-label properties, underscoring that certification credibility not price alone anchors competitive positioning in this market. These findings suggest that certification credibility strengthens competitive positioning and allows certified resorts to maintain higher prices with comparatively smaller losses in demand.

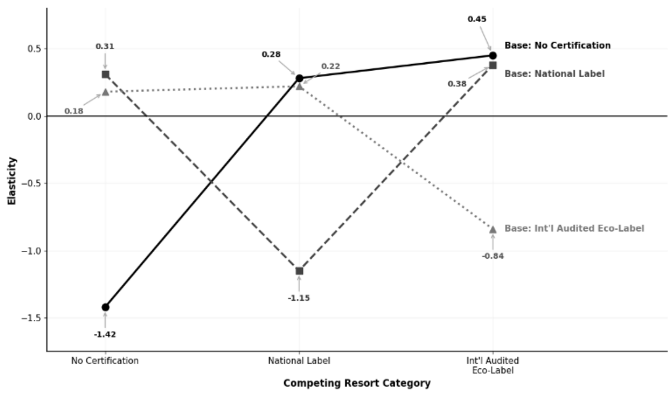

Figure 10. Own- and Cross-Price Elasticity Matrix

Figure 11. Simulated Booking Selection Probability across Nightly Rate Premiums.

4.8 Market Share Simulation Under Bundled Retrofit Packages

To provide practical decision-support for hotel general managers, four comprehensive resort retrofit packages were simulated across a competitive market scenario. Package C International Eco-Label, 100% onsite solar, complete zero-plastic policy, and a +$30/night premium captures the largest simulated market share at 38.6%, more than double the conventional uncertified baseline (18.4%) and substantially ahead of the higher-margin +$45/night variant (18.9%), indicating that $30/night is close to the revenue- maximizing price point for a fully certified offering in this sample.

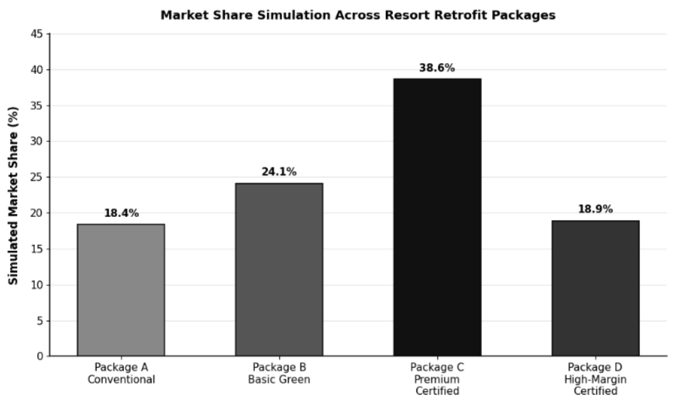

Figure 12. Market Share Simulation Across Resort Retrofit Packages

4.9 Multi-Factor Sensitivity Analysis

To test the stability of WTP estimates, sensitivity analysis was conducted by varying price coefficients and attribute utility weights by ±15% to ±20%. The international eco-label premium remains the dominant driver of simulated revenue across every parameter perturbation tested, confirming that the central policy conclusion is not an artifact of a single point estimate. Even under the most conservative parameter assumptions, internationally certified eco-labels continue to generate a positive and comparatively stronger contribution to expected resort revenue than the other sustainability attributes. The consistency of these results across alternative parameter configurations indicates that the estimated WTP premium is relatively robust to reasonable uncertainty in consumer preferences and price sensitivity. Overall, the sensitivity analysis strengthens confidence in the reliability of the model and supports the conclusion that credible international eco-certification represents a stable source of market value rather than a temporary or estimation-specific effect. The five alternative specifications above bracket the headline international eco-label premium within a narrow $27.90–$29.10 band, and the 100% renewable-energy premium within $15.40–$16.20, indicating that the core commercial conclusions are not sensitive to reasonable modeling choices around the error-component structure, respondent screening threshold, or panel treatment of repeated choice tasks.

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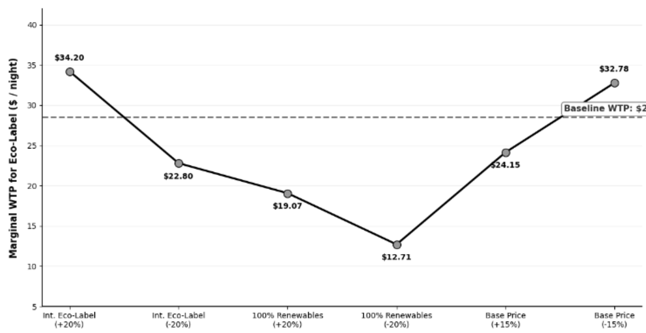

Figure 13. Sensitivity Tornado Diagram of WTP to Model Parameter Shifts

The results are particularly stable under simultaneous changes in both the price coefficient and sustainability-attribute utilities. This indicates that the observed premium for international certification is not simply a consequence of assuming a particular level of price sensitivity. Even when consumers are modeled as substantially more price-sensitive, credible thirdparty certification continues to generate a comparatively strong positive utility effect.

Conversely, when attribute valuations are increased, the international certification premium expands further, reinforcing its position as the most commercially valuable sustainability signal. The robustness of the estimates also has important implications for revenue forecasting and managerial decision-making. Resort operators can reasonably expect the direction of the estimated financial effect to remain stable under plausible changes in consumer preferences, reducing the risk that sustainability investment decisions are based on a highly fragile parameter estimate. The persistence of the international eco-label premium suggests that certification credibility represents a structural component of tourist valuation rather than a temporary or model-specific effect.

This finding is particularly important because it suggests that sustainability investments supported by credible and externally verifiable signals may generate economic value beyond their direct environmental benefits. For resort operators, the results indicate that investments in internationally recognized certification can be considered not only as environmental commitments but also as strategic mechanisms for strengthening market positioning and capturing additional consumer value. More broadly, the consistency of the results across alternative parameter conditions enhances confidence that the estimated sustainability premiums can provide a reliable basis for longterm pricing, investment, and sustainability planning.

Table 7. Robustness Check - Alternative Model Specifications and Estimator Comparison

Specification	**Int'l Eco-Label WTP**	**100% Renewable WTP**	**McFadden Adj. R^2**	**AIC**
Base MIXL (reported)	**+$28.50**	+$15.89	0.326	13,923.6
MIXL, log-normal price coeff.	+$27.90	+$15.40	0.318	14,012.4
MIXL, correlated random parameters	+$29.10	+$16.20	0.331	13,861.2
MIXL, excl. speeders <25% median time	+$28.20	+$15.60	0.322	13,955.7
Panel MIXL, respondent random effects	+$28.80	+$16.05	0.334	13,798.9

Table 8. Summary of WTP Robustness Across Alternative Specifications

Model Specification	**International Eco-Label WTP ($)**	**100% Renewable-Energy WTP ($)**	**Eco-Label Advantage ($)**	**Eco-Label / Renewable Ratio**
Base MIXL	28.50	15.89	12.61	1.79
MIXL, log-normal price coefficient	27.90	15.40	12.50	1.81
MIXL, correlated random parameters	29.10	16.20	12.90	1.80
MIXL, excluding speeders	28.20	15.60	12.60	1.81
Panel MIXL, respondent random effects	28.80	16.05	12.75	1.79
Mean	**28.50**	**15.83**	**12.67**	**1.80**
Minimum	**27.90**	**15.40**	**12.50**	**1.79**
Maximum	**29.10**	**16.20**	**12.90**	**1.81**

Table 9. Percentage Deviation from the Base Model

Model Specification	**Eco-Label WTP Change (%)**	**Renewable WTP Change (%)**	**Adjusted R^2 Change (%)**	**AIC Change (%)**
Base MIXL	0.00	0.00	0.00	0.00
Log-normal price coefficient	−2.11	−3.08	−2.45	+0.64
Correlated random parameters	+2.11	+1.95	+1.53	−0.45
Excluding speeders	−1.05	−1.82	−1.23	+0.23
Panel MIXL, respondent effects	+1.05	+1.01	+2.45	−0.90

Table 10. Range and Stability of Model Estimates

Measure	**Minimum**	**Maximum**	**Absolute Range**	**Mean**	**Coefficient of Variation***
International eco-label WTP ($)	27.90	29.10	1.20	28.50	1.57%
100% renewable-energy WTP ($)	15.40	16.20	0.80	15.83	1.91%
McFadden adjusted R^2	0.318	0.334	0.016	0.326	1.80%
AIC	13,798.9	14,012.4	213.5	13,910.3	0.58%

*Coefficient of variation calculated as standard deviation divided by the mean.

The panel MIXL specification produces the highest McFadden adjusted R^2 and the lowest AIC, suggesting the strongest overall statistical fit among the tested alternatives. Importantly, this specification also produces an eco-label WTP estimate of $28.80, which remains very close to the headline estimate of $28.50.

The low coefficients of variation demonstrate substantial stability across alternative model specifications. In particular, the international eco-label WTP exhibits a variation of only approximately 1.57%, reinforcing the robustness of the estimated premium.

Table 11. Model-Fit Comparison

Specification	McFadden Adj. R^2	AIC	Rank by Adj. R^2	Rank by AIC
Base MIXL	0.326	13,923.6	3	3
Log-normal price coefficient	0.318	14,012.4	5	5
Correlated random parameters	0.331	13,861.2	2	2
Excluding speeders	0.322	13,955.7	4	4
Panel MIXL, respondent effects	**0.334**	**13,798.9**	**1**	**1**

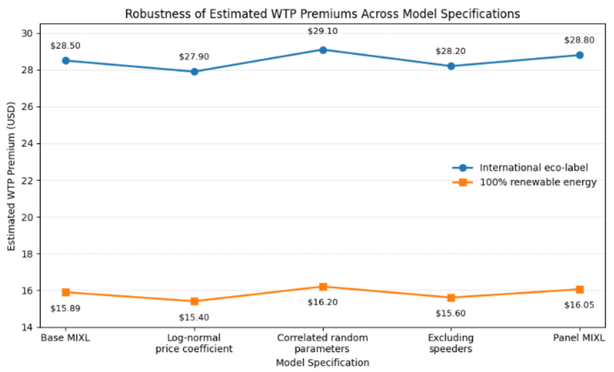

Figure 14. Estimated WTP Premiums Across Alternative Model Specifications.

Figure 14. Robustness of Estimated WTP Premiums Across Alternative Model Specifications. The international eco-label premium remains consistently higher than the 100% renewable-energy premium across all alternative specifications, with estimates ranging from \$27.90 to \$29.10 and \$15.40 to \$16.20, respectively.

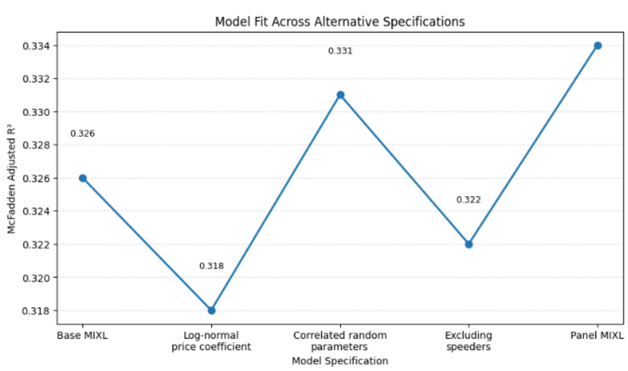

Figure 14. Model Fit Across Alternative Model Specifications.

McFadden adjusted R^2 remains within a narrow range of 0.318–0.334 across all specifications, indicating that alternative assumptions about price heterogeneity. The AIC values remain relatively close across specifications, while the panel MIXL specification provides the lowest AIC (13,798.9), indicating comparatively stronger model performance without changing the substantive WTP conclusions. . This may also reduce the risk of greenwashing perceptions and strengthen consumer confidence in premium sustainability-oriented accommodation products.

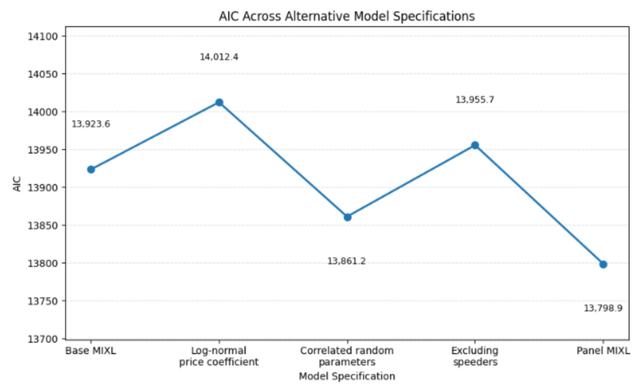

Figure 16. AIC Across Alternative Model Specifications.

5. Conclusion and Recommendations

5.1 Theoretical Conclusions

This study provides robust empirical evidence that third-party green certification creates substantial economic value in coastal eco-resort markets. By establishing an explicit hierarchy of tourists' Willingness-to-Pay (WTP), the findings provide strong support for the central proposition of Signaling Theory (Spence, 1973; Casado-Díaz et al., 2020): consumers place substantially greater economic value on environmental claims when those claims are supported by credible, externally verifiable certification mechanisms. The estimated WTP for internationally audited eco-labels (+\$28.50/night) is substantially higher than the premium associated with unaccredited regional green badges (+\$7.11/night), demonstrating that certification credibility is an important determinant of the economic value attached to sustainability attributes.
The findings also demonstrate that tourists do not evaluate sustainability as a single homogeneous concept. Instead, they differentiate between credible certification, visible environmental practices, and specific operational sustainability investments. Internationally audited certification provides an external assurance mechanism that reduces uncertainty regarding the authenticity of environmental claims, while tangible initiatives such as 100% renewable energy reliance (+\$15.89/night) and complete elimination of single-use plastics (+\$14.20/night) provide observable evidence of actual environmental commitment. These results help bridge the frequently observed gap between general environmental attitudes and

actual consumer behavior in tourism markets (Dunlap et al., 2000; Juvan & Dolnicar, 2014; Park & Lin, 2020).

The results further contribute to the tourism sustainability literature by demonstrating that environmental attributes can generate measurable market-based economic value rather than functioning solely as compliance or corporate social responsibility investments. The estimated premiums indicate that a meaningful segment of international tourists is willing to incorporate environmental performance into accommodation purchase decisions. This suggests that sustainability investments can simultaneously support environmental objectives and create opportunities for differentiated pricing, provided that the underlying environmental claims are credible and visible.

The extended robustness analysis reported in Table 7 further strengthens these theoretical conclusions. Across five alternative econometric specifications, the estimated international eco-label premium varies by less than $1.20, indicating that the central WTP hierarchy is not dependent on a particular model specification. The consistency of the results also suggests that the relative importance of certification credibility remains stable after accounting for alternative assumptions regarding consumer preferences and price sensitivity. Collectively, these findings position credible environmental certification as both an informational signal and a commercially valuable market attribute.

5.2 Managerial and Policy Recommendations

Recommendation 1: Accredited International Eco-Labels

Resort general managers should prioritize internationally recognized and independently audited certification schemes, such as EarthCheck and Green Key, rather than relying primarily on internally developed or weakly verified environmental badges. The substantial difference between the WTP for internationally audited certification (+$28.50/night) and regional unaccredited certification (+$7.11/night) indicates that consumers respond more strongly when sustainability claims are supported by credible external verification. Investments in certification should therefore be viewed as a strategic market-positioning decision rather than solely as an environmental compliance expense.

Resorts should also communicate certification credentials clearly across booking platforms, websites, digital advertisements, and in-property materials. Transparent communication can help consumers understand what the certification represents and distinguish independently verified sustainability performance from generic environmental marketing claims

Recommendation 2: Focus CAPEX on High-Visibility Infrastructure

Resort operators should prioritize sustainability investments that are both environmentally meaningful and easily observable to consumers. The findings indicate particularly strong WTP for complete single-use plastic elimination and 100% renewable energy reliance, suggesting that these initiatives can provide both environmental benefits and market differentiation. Solar photovoltaic installations, renewable electricity procurement, refill stations, elimination of disposable plastic amenities, and visible waste-reduction systems can therefore be incorporated into broader capital-investment planning.

The strategic value of these investments extends beyond their direct environmental impact. Visible sustainability infrastructure provides consumers with tangible evidence that environmental commitments are being implemented operationally rather than existing only as promotional claims. Resort managers should therefore evaluate sustainability CAPEX using a combined framework that considers expected environmental performance, operating-cost savings, customer visibility, and potential room-rate or occupancy benefits.

Recommendation 3: Implement Tiered Market Pricing

Resorts should adopt differentiated pricing strategies that reflect heterogeneity in tourists' environmental preferences. The estimated 34% Eco-Dedicated segment represents a potentially valuable market for premium certified rooms, eco-suites, and sustainability-focused accommodation packages. These consumers may be willing to pay a meaningful premium for accommodation that combines internationally recognized certification with visible environmental practices.

At the same time, sustainability-oriented products should not be positioned exclusively as high-priced offerings. Price-sensitive guests can be provided with standard accommodation options alongside optional green upgrades, such as renewable-energy packages, plastic-free amenities, locally sourced products, or certified eco-experiences. Such tiered pricing allows resorts to capture additional WTP from environmentally motivated consumers without excluding customers who have lower willingness to pay for sustainability attributes.

Recommendation 4: Establish Destination-Wide Eco-Standards

Tourism boards, municipal authorities, and destination-management organizations should develop common sustainability standards for coastal resort clusters. Destination-wide standards can reduce information asymmetry by establishing consistent criteria for environmental performance and certification. Public institutions can further support smaller hotels and resorts by co-funding certification audits, providing technical assistance, and developing standardized sustainability reporting frameworks.

Such interventions may be particularly important for small and medium-sized accommodation providers that face relatively high fixed certification and compliance costs. Collective accreditation programs or destination-level certification initiatives could reduce these barriers through economies of scale. Establishing consistent standards would also prevent the proliferation of weak or misleading environmental labels that may reduce consumer confidence in the broader eco-tourism market.

5.3 Limitations and Future Research

Despite the robustness of the empirical findings, this study has several limitations that should be considered when interpreting the results. First, the sample is weighted toward digitally engaged international travelers who participated in online research panels. Although the sampling design included respondents from multiple major tourist-generating regions, online participation may underrepresent older travelers, individuals with limited digital access, and tourists who make accommodation decisions through offline travel agencies or other traditional channels. Future studies should therefore combine online choice experiments with in-destination intercept surveys and broader probability-based sampling approaches to improve external validity. Second, the experimental design measures stated preferences rather than revealed booking behavior. Although the choice experiment provides a controlled environment for estimating marginal WTP and comparing sustainability attributes, respondents may behave differently when making actual accommodation purchases. Future research should therefore validate the estimated WTP hierarchy using transaction-level booking data, observed room rates, occupancy rates, and booking conversion rates from certified and uncertified coastal resorts. Linking stated preferences with actual market behavior would provide stronger evidence regarding the extent to which sustainability premiums translate into realized revenue.

Third, the market-share simulation presented in Section 4.8 assumes a relatively fixed competitive environment consisting of four accommodation packages. In real tourism markets, competing resorts can continuously modify room prices, certification status, promotional offers, and sustainability investments. Future research could therefore incorporate a larger and dynamically evolving competitive set in which resorts respond strategically to changes in consumer demand and competitor pricing. Such an approach would provide a more realistic assessment of how eco-certification influences long-term market positioning.

Fourth, the present analysis captures consumer preferences at a specific point in time and therefore cannot fully determine how environmental preferences evolve as sustainability practices become more widespread. Longitudinal research following the same respondents across multiple booking periods could determine whether WTP for certification increases as consumers become more familiar with international eco-labels or decreases as certification becomes a standard market expectation. Such research would also provide an opportunity to examine whether repeated exposure to certified accommodation reduces the attitude behavior gap identified in previous sustainability research.

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