Strategic Change

WILEY

RESEARCH ARTICLE OPEN ACCESS

Technology-Enabled Sustainability: Behavior-Based Carbon Footprint Levy in Hotels

Kyriaki Glyptou

School of Events, Tourism and Hospitality Management, Leeds Beckett University, Leeds, UK

Correspondence: Kyriaki Glyptou (k.glyptou@leedsbeckett.ac.uk)

Received: 24 June 2024 | **Revised:** 27 January 2025 | **Accepted:** 27 January 2025

Keywords: behavior-based levy | carbon-footprint apps | hotel green levy | sustainable tourist behavior

ABSTRACT

The paper explores the predisposition of domestic and international urban tourists of Athens, Greece, to pay an app-calculated green levy based on the carbon footprint (CF) of their hotel stay. The study employs fuzzy-set qualitative comparative analysis (fsQCA) to explore the complex configurations between the effects of the sustainable hotel profile, disposable income for tourism, digital literacy, knowledge around CF, and environmental behavior during hotel stay on guests' willingness to pay for the technology-calculated green levy appropriated to their individual behavior. fsQCA produced three sufficient pathways, namely, pragmatistic, environmental conscious, and opportunistic, as plausible customer profiles. Findings are compared against other dominant correlational modes of analysis to highlight the underlying complexity of tourist behavior and hence the need for the application for non-parametric methods of analysis. The theoretical contribution of the paper lies in the integration of the concepts of digital literacy, environmental awareness, and behavior-based levies. Technology-enabled and self-controlled tools can support transparent and appropriated green levies and promote ownership of carbon offsetting in the hospitality industry.

1 | Introduction

The concern around greenhouse gases (GHGs), carbon footprint (CF) calculation, and carbon offsetting in the hospitality industry has undoubtedly grown over the last few years. With the accommodation accounting for almost half of the global carbon dioxide attributed to the sector (World Tourism Organization 2023) and with a steadily increasing number of accommodation facilities globally, there is an imperative need for the hotel industry to involve all their stakeholders in combined efforts for carbon neutrality (Chan 2021a). Technology-enabled CF tracking apps (CFTAs) and websites (e.g., TripZero, GreenView Hotel Footrpinting Tool) allow both individuals and businesses to monitor the CF of their behavior and operations in detail. In fact, for most businesses, this is an expectation for achieving green certification and to align with the industry's targets along the SDGs. From an individual customer's perspective, CFTAs are quite niche, used on a voluntary or rather curiosity basis to educate on the impact of behavioral habits on the environment and sustainability. Even if there is plenty of research suggesting that environmental consciousness and awareness of individuals do not necessarily match their behavior (Munro, Kapitan, and Wooliscroft 2023; White, Habib, and Hardisty 2019), research on the effectiveness of self-chosen and calculated environmental digital environments to nurture actual behavioral change is young and rather sparse (Hoffmann et al. 2024).

With the increasing pressure of carbon offsetting in hotels (Köseoglu et al. 2020), the challenge around the perceived associated economic cost remains prominent, particularly in times of economic uncertainty (Nickerson, Jorgenson, and Boley 2016; Higham and Miller 2018). The idea of a green and carbon tax is not new to the tourism industry. In their research on the CF of tourism in Barcelona, Rico et al. (2019) identified that to achieve substantial reductions in CO_2 emissions in the accommodation sector, strategic initiatives that include guests are necessary. Other than the operational hotel CF along with energy consumption, water usage, and waste

Summary

- Digital literacy and digital environments advance hotel guests' willingness to compensate for their carbon footprint.
- Digital literacy and individually controlled digital environments (apps) advance the reliability and transparency of the carbon footprint levy.
- Plausible customer profiles with increased predisposition to pay for individually app-calculated carbon footprint levies are: the pragmatist, the environmentally conscious, and the opportunist.
- Non-parametric methods of analysis offer higher sensitivity and reliability in the analysis of inherently complex concepts such as tourist behavior.
- The paper critically explores tourists' predispositions to pay an app-calculated carbon footprint levy appropriated to their individual behavior during their hotel stay.

management to maintain a quality service experience, the CF of a hotel comes down to guests' activities and behavior during their stay at a great extent (Chan 2021b). The "Polluter Pays Principle" has been often invoked to, where possible, assign the cost of environmental burden contribution to those causing it rather than to those who suffer its consequences and to propose associated green taxes and charges (Mittiga 2019). At macro-level (destination), it has been often employed as "cardinal instrument" for climate action and consumption-based carbon accounting (Khan 2015). Its application at the micro level (business level), like in the case of hotels, is fraud with social and ethical complexities, which is beyond the scope of this paper. In the context of carbon neutrality, however, the carbon offsetting of hotel business CO_2 emissions could consider the direct compensation of guests' contribution through an appropriated carbon levy.

From an organizational perspective, technological advancements have always driven changes in consumer behavior, performance, and competition patterns (Gunduz Songur, Turktarhan, and Cobanoglu 2023). With supply and demand dynamically interlinked, the motivations and antecedents behind consumer behavior inform organizational learning, experimentation, and service innovation culture (SIC) through disruptive and innovative strategy interventions (Baradarani and Kilic 2018). The change in strategy paradigms toward more sustainable futures has already been at the forefront of the UN 2030 Agenda, making the contribution of tourism, among all sectors, pressing and essential regardless of the adversities of the current environment (Glyptou 2022; Pizzi et al. 2020). The operationalization of tourism business resilience, resilience innovation along a business' environmental performance, and in view of customers' sustainable behavior predisposition appears of outermost importance (Higham and Miller 2018). However, environmental performance and green tourism behavior require a thorough understanding of complex tourism systems (Franzoni 2015; Palumbo et al. 2021). Moreover, the dominant in tourism reductionist approach (linear analysis) does not seem to be able to fully encapsulate the complexity of tourism behavior under the current uncertain times (Moscardo 2021). This is because tourism behavior entails numerous interactions and indicators, and the nonlinear examination of this behavioral complexity can provide a substantial insight for its formulation (Olya and Mehran 2017).

The aim of this paper is to critically explore the modifiers of hotel guests' predisposition to compensate for their CF through a behavior-based app-calculated green levy. It thus explores perceptions around CF behavior-based levies, rather than horizontal ones, that contribute to the sector's offsetting through a transparent and self-controlled app. The research takes place in Athens, Greece, an internationally well-established urban destination during the months of the summer peak season. To explore these perceptual dynamics, the paper examines the influence of the sustainable hotel profile (HP), disposable income for tourism, digital literacy (DL), CF knowledge, and environmental behavior (EB) of Athens hotel guests in relation to the average cost of an overnight stay in a hotel of any category.

The study contributes to both theoretical and methodological domains. In terms of literature, its contribution lies in the examination of the complex behavioral patterns concerning tourism sustainability, ownership of CF contribution, and levy calculation transparency. In this regard, it paves the way for an exploration of resilient business models and service innovation that safeguard sustainability endeavors in the sector while nurturing an environmental responsibility culture. Its methodological contribution lays in the implementation of fuzzy-set qualitative comparative analysis (fsQCA) to explore behavioral complex causality and propose alternative solution pathways (through causal configurations) that overcome the dominant correlational modes of direct analysis.

2 | Literature Review

2.1 | The Complexity of Tourism Behavior

Complexity theory advocates that seemingly similar events may lead to diverse outcomes and that the impact of even small behavioral changes to a system might be significant and difficult to predict (Baggio and Sinaghi 2011). Complex systems operate under nonlinear dynamics characterized by emergence, evolution, and self-organization (Arévalo and Espinosa 2015). In conceptualizing tourism behavior as a complex dynamic system of both cognitive and perceptual drivers, the actual outcome behavior is subject to the continuous integration and co-evaluation of different inputs, at different states and different configurations (Sainaghi and Baggio 2017). This adaptive behavioral capacity of individuals encompasses their psychological complexity, allowing them to adjust to externalities and new information (Hall, Prayag, and Amore 2018) At the same time, complexity theory, particularly in the context of behavioral sciences, recognizes that although hard to predict, behaviors still have a contextual structure that permits improvements (Bickley and Torgler 2023; Zahra and Ryan 2007). This chaordic approach (order amidst chaos) is used for the examination and explanation of the heterogeneous, dynamic, and non-parametric processes of complex system behaviors in several disciplines. In the context of tourism

behavior, it provides the basis for the comprehension of the relationships between outcome behavior and its causal antecedents (Agag et al. 2020; Olya and Al-Ansi 2018) and can assist in the encapsulation of a decision-making and behavioral nonlinear perspective as a series of actions and reactions to multiple considerations (cognitive and perceptual). This extent of behavioral complexity in tourism decision-making and willingness to pay renders Newtonian (linear) thinking inadequate, hence suggesting the appropriateness for nonlinear approaches of analysis (Huang 2021; Moscardo 2021).

This research focuses on the complexity of tourist sustainable predisposition and behavior when a self-controlled technology-calculated accommodation levy is imposed. Several studies explore tourist sustainable behavior in hotels (Agag et al. 2020; Nimri, Patiar, and Jin 2020) and willingness to pay for carbon offsetting (Choi and Ritchie 2014; Wu, Zhang, and Song 2024), but limited research is available on the integration of multiple cognitive and perceptual parameters around the use of self-calculated carbon apps during hotel stays and their associated levy. The essence of sustainability is associated with the process of continuous (societal, environmental, economic, political, technological, legal) improvements. The latter is further reinforced by the increasing consciousness for a change of business and behavioral paradigm promoted by the UN 2030 Agenda and driven by the SDGs (Rosato et al. 2021).

The impact of process transparency and fairness on the sustainability behavior and tourists' willingness to pay from green levies remains limited. Literature has been primarily exploring sustainable innovation that drives carbon offsetting from a business rather than a customer perspective (Lv et al. 2018). What needs to be explored in this case is how the options dictated by technological advancements may change the sustainability priorities of the tourists and how the business ecosystem could benefit from them in line with the UN 2030 Agenda and the pursuit of sector's carbon neutrality.

3 | Methods

3.1 | Study Tenets

In the service sector, the term "tenet" refers to testable precepts concerning the identification of order in systems, here behaviors, characterized by complexity (Pappas and Glyptou 2021). The adequacy and accuracy of the complex configurations is assessed based on the theoretical and empirical relationships between the conditions rather than on statistical hypothesis testing and consistency metrics (Wu et al. 2014). fsQCA is here employed to explore the causal complexity, alternative pathways, and qualitative assessment of the configurations underlying hotels' guest willingness to pay for the individually calculated carbon footprint.

Along with the overnight accommodation cost per capita, five more attributes are studied here: (i) sustainable HP, (ii) disposable income for tourism, (iii) DL, (iv) CF knowledge, and (v) EB during hotel stay. Following Olya, Altinay, and De Vita (2018) and Pappas (2017), the study tenets examined here are the following:

T1. *A simple antecedent is not sufficient to predict a high score of the predisposition to pay a technology-calculated CF levy.*

T2. *Recipe principle: When two or more simple conditions formulate a complex configuration, an outcome condition can have a high consistency score.*

T3. *Equifinality principle: A sufficient predisposition to pay a technology-calculated CF levy does not generate a high outcome score.*

T4. *Causal asymmetry principle: Causal configurations/interactions that can predict predisposition to pay a technology-calculated CF levy are unique and not the mirror opposites of configurations/interactions of a different outcome.*

T5. *Attribute of action: The simple conditions of configurations/interactions can positively or negatively impact different combinations of predispositions to pay a technology-calculated CF levy.*

T6. *When the Y scores are high, a given solution for predispositions to pay a technology-calculated CF levy is not relevant for all cases.*

3.2 | Participants

The research was conducted in Athens, Greece, between late July and September 2023, and examined the predispositions of both domestic and international tourists that were, at the time, using hotels of any category for their accommodation. The research was carried out in the two most central squares (Omonia and Symtagma) of the city. Recruiting participants in communal busy areas reduces convenience bias and increases participants diversity and response rates (Bryman 2016). This study was based on self-administered questionnaires, with an average completion time of around 10 min. The respondents were randomly approached and asked to fill in the questionnaire. Data collection took place at different times of the day to enhance population variance. A list-wise deletion (exclusion of the entire record from the consequent analysis) was employed in the rare cases of handling missing data.

3.3 | Sample Collection

According to Bryman (2016), when the proportion of the population is unknown, the conservative response format of 50/50 (50% of the respondents have positive perspectives, and 50% have not) should be selected, while a 95% minimum level of confidence and a maximum of 5% sampling error should exist.

Four hundred domestic and international tourists were approached in the two central squares of Athens, namely, Omonia ($N = 200$) and Syntagma ($N = 200$) Square. Three hundred and ninety-four useful questionnaires were collected (196 in Omonia; 198 in Syntagma), generating a combined response rate of 98%. With an Athens visitor population size of more than 20,000 per day (INSETE Statistical Bulletin 2024), the Raosoft Inc. Sample Size Calculator's recommended minimum sample size was 377. With the ensured high response rates of 98%, the

sample size of obtained 394 useful surveys corresponds to a 4.9% margin of error and a 96% level of confidence, which are within the acceptable levels of similar social studies (Bryman 2016; Park and Huang 2017).

3.4 | Measures

The questionnaire consisted of 36 Likert Scale (1 strongly disagree/5 strongly agree) statements and one exclusion question requiring participants to be residing in Athens hotels of any category for at least one overnight. The statements were designed to explore the thinking process and behavior of Athens urban tourists regarding: Sustainable HP, adapted from D'souza and Taghian (2005) and Wang et al. (2018); disposable income for tourism, adapted from Sanchez et al. (2006) and Tarnanidis et al. (2015); DL adapted from Kim (2016); CF knowledge and EB during the stay adapted from Foroughi et al. (2022); and willingness to pay for individual CF app-calculated levy adapted from Kim (2016), Lee (2018), and Park and Huang (2017).

The average price of a hotel room per capita per night of stay groups the sample into two categories with a threshold of 70 Euros (estimated through Booking.com for July–September 2023).

fsQCA is employed here to examine the willingness of hotel guests to pay for an individual behavior-based app-calculated CF levy by estimating the complex antecedent conditions (causal recipes), leading to high membership scores along the previously chosen attributes. All respective relationships generate a general asymmetry when the absolute values of all correlated coefficients are lower than 0.60 (Skarmeas, Leonidou, and Saridakis 2014). Table 1 indicates that all correlation values are less than 0.60, suggesting that the causal conditions generated by the alternative combinations are likely to lead to the same outcome condition (Woodside 2013). Following Skarmeas, Leonidou, and Saridakis (2014), a solution is considered acceptable and informative when the generated consistency is above 0.74 and coverage is between 0.25 and 0.75. Taking into account this complexity of available combinations, this research assumes that non-parametric (nonlinear) relationships exist between the five variables, as opposed to Newtonian (linear) net effects. Woodside and Zhang (2013) suggested that fsQCA further focused on the estimation of negated sets (presence or absence of a given condition). Attributional absence is here indicated by the symbol "~".

3.5 | fsQCA Algorithms

The study evaluates the complex configurations (causal recipes) able to generate a high membership score. According to Ragin and Sonnett (2004), complex solutions are the preferred ones, since the complexity reduction requires the incorporation of simplifying assumptions that include "difficult" counterfactuals. The calibration of the study was achieved by using 38 randomly selected individual cases. The examination of respondents' willingness to pay (f_wip) was made through the fuzzy set calibration of overnight per capita price (f_op), sustainable HP (f_hp), disposable income for tourism (f_di), DL (f_dl), CF knowledge (f_cf), and EB (f_eb). The inclusion of an additional antecedent is illustrated by "*", and the absence (i.e., negation—low inclusion level) of a simple condition is highlighted by the symbol "~".

4 | Results

fsQCA generated three sufficient complex configurations for hotel guests' willingness to pay for a behavior-based app CF levy (Table 2). The first complex solution (~f_oc, ~f_hp, ~f_di, f_dl, f_cf, f_eb) ignores the grouping variable of overnight cost per capita and includes high membership scores for DL; knowledge about CF and EB can generate a high score. This configuration appears to have the highest coverage (0.452) and consistency (0.856). The second solution (~f_oc, f_hp, ~f_di, ~f_dl, f_cf, f_eb) again excludes the calibration variable of overnight cost per capita and indicates that the profile of the hotel accommodation along the CF knowledge and EB during the stay is a sufficient aspect to trigger willingness to pay the CF levy. This configuration appears to have the lowest coverage (0.418) of all three solutions. Finally, the third solution (f_oc, f_hp, f_di, ~f_dl, ~f_cf, f_eb) includes the calibration variable of overnight cost per capita and shows further high scores for the antecedents of disposable tourism income for tourism and EB. This configuration appears to have the lowest consistency (0.819) compared with the previous ones. In summary, the three sufficient configurations refer to (a) the pragmatist pathway, where high DL, knowledge about CF, and EB lead to a higher knowledge around the benefits of CF calculations and may generate a high predisposition (as in membership scores) to pay for individually calculated a CF levy; (b) the conscious environmental commitment pathway, consisting of the antecedents of HP, CF knowledge, and EB; and (c) the opportunistic pathway, including elements of price–behavior

TABLE 1 | Correlation matrix.

		1	2	3	4	5	6
1	HP	1					
2	DI	0.007	1				
3	DL	0.025	−0.450	1			
4	CF	0.305	0.436	0.004	1		
5	EB	0.107	0.022	−0.441	0.469	1	
6	WIP	0.502	−0.525	0.367	−0.153	0.586	1

Note: Correlation is significant at the 0.01 level.

TABLE 2 | Complex solutions on sustainable tourism behavior.

Complex solution	Raw coverage	Unique coverage	Consistency
Model: f_wip = f (f_oc, f_hp, f_di, f_dl, f_cf, f_eb)			
~f_oc, ~f_hp, ~f_di, f_dl, f_cf, f_eb	0.452	0.128	0.856
~f_oc, f_hp, ~f_di, ~f_dl, f_cf, f_eb	0.418	0.114	0.832
f_oc, f_hp, f_di, ~f_dl, ~f_cf, f_eb	0.425	0.107	0.819
Solution coverage: 0.434	Solution consistency: 0.837		
f_op: Overnight cost per capita f_hp: Hotel profile d_in: Disposable income	f_dl: Digital literacy f_cf: Carbon footprint knowledge	f_eb: Env behavior during stay f_wip: Willingness to pay	

nexus, comprising of the overnight cost per capita, the disposable income, and the EB.

4.1 | Confirmation of Tenets

The findings suggest that a simple condition (i.e., disposable income for tourism) is necessary for predicting tourists' willingness to pay for digitally appropriated CF levy (solutions 1 and 3) but not sufficient to generate high outcome scores on its own. This confirms the first tenet (T1) of the research. All the high consistency scores are formulated by complex configurations, since they are the outcome of the combination of at least two simple antecedents (solutions 1 and 2: presence of three simple conditions; solution 3: presence of four simple conditions). This outcome confirms the recipe principle (T2). fsQCA results indicate that in all generated pathways, the outcome scores for sustainable tourist behavior were low. As Varnali (2019) suggested, in complex systems, high outcome scores could be generated by more than one configuration of antecedent elements. This outcome leads to the confirmation of the equifinality principle (T3). When comparing the three generated solutions, they are not mirror opposites. Following Olya, Altinay, and De Vita (2018), this finding confirms the existence of causal asymmetry as expressed in the fourth tenet (T4). The results also highlight that the generated solutions are impacted positively or negatively by the inclusion of a simple antecedent. This leads to confirmation of the attribution of action tenet (T5). Finally, the coverage of the sufficient configurations varies from 0.418 to 0.452. This confirms the sixth tenet (T6), since it provides evidence that none of the solutions applies in all cases (Pappas 2017).

4.2 | fsQCA Versus Correlational Analysis

fsQCA findings were compared against regression and Cramer's V statistic tests to explore potential outcome variances across the two approaches. For the evaluation of the linear relationships, the study employed confirmatory factor analysis (CFA), since all examined items were adopted from previous studies. The model fit determination and the identification of causal relationships among constructs were examined using SEM. The χ^2 ratio was divided by the number of degrees of freedom (χ^2/df), as suggested for large samples ($N = 394$), and the key four measures were estimated, namely, χ^2, comparative fit index [CFI], standardized root-mean-square residual [SRMR], and root-mean-square error of approximation [RMSEA] Kline (2010). The model fit was as follows: $\chi^2 = 309.472$, df = 166, χ^2/df = 1.864 (acceptable value $0 \leq \chi^2/df \leq 2$ (Schermelleh-Engel, Moosbrugger, and Müller 2003)), CFI = 0.907 (acceptable value is when CFI is close to 1.0 (Weston and Gore Jr 2006)), SRMR = 0.786 (acceptable value is when SRMR < 0.8 (Hu and Bentler 1999)), and RMSEA = 0.473 (acceptable value is when RMSEA < 0.5 (Browne and Cudeck 1993)).

The important components of the study were identified through factor analysis, while values less than 0.4 were suppressed (according to Norman and Streiner (2008), the minimum acceptable value is 0.4). Cronbach's A was employed for the evaluation of internal consistency, generating an overall reliability of 0.751, while all constructs scored over 0.7 (minimum value of 0.7; Nunnally 1978). Average variance extracted (AVE) was used for the evaluation of the study's convergent validity, highlighting the adequacy of the research, since it generated an output higher than 0.5 for all constructs (Kim 2014). These findings are illustrated in Table 3.

The endogenous variables of the study are presented in Figure 1. The overall R^2 of the linear model was 0.304, indicating a rather moderate ability to explain the variation in the data. The overnight cost per capita appears to influence all the examined constructs, mostly impacting on "disposal tourism impact", "sustainable hotel image", and "environmental behavior during stay".

The study further compared the findings of asymmetric against correlational analysis to further refine the interpretation of causal and directional relationships among the parameters dictating behavioral complexity. This comparison was based on the ability for each method to capture different perspectives and influences, their potential to identify alternative routes leading to the same outcome, and the extent of representativeness (coverage) of the examined sample. Findings suggest that the contribution of regression is limited to a single pathway, that is, the linear impact of overnight cost per capita (grouping variable) on the examined constructs and the influence of the latter on tourists' willingness to pay a CF app-calculated levy. Interestingly, the first two configurations produced through fsQCA (pragmatism and environmental conscious pathways) did not include the grouping variable of overnight cost nor other constructs

TABLE 3 | Cronbach's *A*, AVE, and factor analysis.

	Statements	AVE	Cronbach's *A*	Loadings
	Sustainaible hotel profile	*0.517*	*0.701*	
HP1	In my experience, the hotel is innovative and pioneering			0.666
HP2	In my experience, the hotel does business in an ethical way			—
HP3	In my experience, the hotel is open and responsive to consumers			0.638
HP4	In my experience, the hotel management emphasizes on sustainability			0.839
HP5	In my experience, the hotel's sustainability initiatives/messaging is appropriate			0.643
HP6	In my experience, the hotel's sustainability initiatives/messaging is pleasant			0.809
HP7	In my experience, the hotel's sustainability initiatives/messaging is convincing			0.693
	Disposable income for tourism	*0.567*	*0.758*	
DI1	The current cost of living has negatively affected my tourism expenditure			0.899
DI2	The current cost of living has negatively affected my hotel choice due to the financial cost involved			0.774
DI3	The current cost of living has negatively affected the duration of my holidays due to the financial cost involved			0.787
DI4	The current cost of living has negatively affected my destination choice due to the financial cost involved			0.765
	Digital literacy	*0.559*	*0.727*	
DL1	Overall, I find apps easy to use			0.798
DL2	My interaction with the hotel CF app will be clear and understandable			0.568
DL3	It will be pleasant for me to regularly record my behavior during my stay			—
DL4	It will be easy for me to get the hotel CF app to do what I want it to do			0.802
DL5	It will be useful for me to get the hotel CF app to do what I want it to do			0.796
	Carbon footprint knowledge	*0.518*	*0.708*	
CF1	I know more about carbon footprint issues than the average person			0.628
CF2	I know more about environmentally friendly behaviors than the average person			0.863
CF3	I know more about energy saving than the average person			0.682
CF4	I know more about water saving than the average person			0.667
CF5	I know more about food waste than the average person			0.814
CF6	I know more about recycling and landfilling than the average person			—
CF7	I know more about carbon offsetting than the average person			—
	Environmental behavior during hotel stay	*0.529*	*0.797*	
EB1	I turn-off the water when possible (brushing teeth/taking shower)			0.788
EB2	I recycle recyclable materials such as newspapers, cans, or bottles			0.770
EB3	I avoid using travel-size toiletries when possible			—
EB4	I avoid using the air-conditioning when possible			0.737
EB5	I reuse bedsheets and bathroom towels			0.601
	Willingness to pay according to CF app	*0.520*	*0.897*	
WIP1	I would find the CF app secure to disclose my personal information			0.638
WIP2	I would find the CF app secure in conducting my transactions			0.662

(Continues)

TABLE 3 | (Continued)

	Statements	AVE	Cronbach's *A*	Loadings
WIP3	I would find the CF app reliable in conducting my transactions			0.672
WIP4	I see the benefit in paying according to my CF during my stay			0.607
WIP5	I see the reason in paying according to my CF during my stay			0.601
WIP6	Using the hotel CF app will make me understand how my green tourist tax is calculated			0.890
WIP7	Using the hotel CF app will make me feel like a green tourist			0.905

Note: Construct statements with values less than 0.4 are not presented due to low commonality.

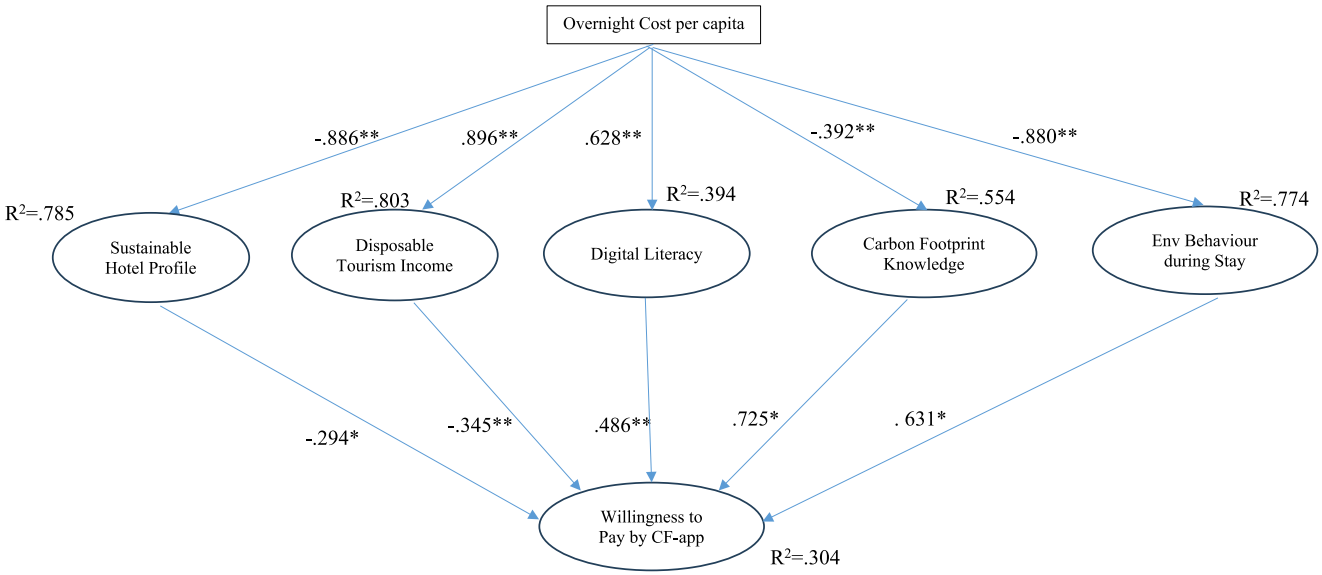

FIGURE 1 | Influential factors on tourism sustainable behavior. *Coefficients are significant at the 0.05 level. **Coefficients are significant at the 0.01 level. [Color figure can be viewed at wileyonlinelibrary.com]

required by the SEM analysis. On the other hand, the grouping variable and disposable income construct is present in the last of the three generated solutions, while some other variables are absent (DL and CF knowledge). One more significant aspect is that all three sufficient configurations appear to generate a considerably higher row coverage (between 0.418 and 0.452), also characterized by high consistency (over 0.8), than the overall R^2 (0.304) produced by linear analysis.

The second correlational analysis employed by the study was Cramer's *V* (Table 4), which varies from none (0) to complete (1) association (Burns and Burns 2008). Results indicate moderate to moderate strong associations in all cases (Sig. < 0.05) with the highest association observed with disposable income (Cramer's $V = 0.433$). It is interesting to note that the antecedent of disposable income appeared in only one of the three fsQCA produced configuration, hence indicating the sensitivity of the method to capture the effect of the examined constructs.

TABLE 4 | Cramer's *V*.

	χ^2	Cramer's *V*	Sig.
Willingness to pay by CF app * Sus hotel profile	422.854	0.344	0.000
Willingness to pay by CF app * disposable income	666.730	0.433	0.000
Willingness to pay by CF app * digital literacy	485.983	0.369	0.000
Willingness to pay by CF app * CF knowledge	264.118	0.301	0.000
Willingness to pay by CF app * Env behavior	470.737	0.363	0.000

5 | Discussion

The study explores hotel guests' predisposition for the application of an individually adjusted app-calculated CF levy along with its associated modifiers through linear and non-linear methods of analysis. The study confirmed the complexity associated with behavior-based pricing (Li, Li, and Wang 2020) in the context of green behavior and hotel services even by means of self-controlled and calculated apps. In comparison to the linear methods, fsQCA showed higher sensitivity to capture the multiple outcome pathways, to accommodate the associated

contextual and behavioral ambiguity, and to support the configuration analysis of condition combinations often overlooked (e.g., price benefit incentive).

The first sufficient configuration focuses on the practicality and efficiency of an individually calibrated CP levy, as it includes the antecedents of DL, CF knowledge, and EB, regardless of the overnight cost grouping variable nor the disposable income for tourism. This configuration suggests a more pragmatist approach, where technology enables a faster, fairer, and more transparent calculation of a levy associated with an individual's behavior and associated CF (Morosan and DeFranco 2016). This configuration is further associated to high CF knowledge and EB regardless of the category or level of hotel facilities. This pathway for willingness to pay generated the highest coverage and consistency and suggests that tourist-controlled digital apps can facilitate a culture and mindset of pragmatism, transparency, and fairness around individual ecological footprint contributions. Transparency through behavior-based pricing has been found to drive reputation and customer loyalty (Lee 2018; Li, Li, and Wang 2020).

The second configuration captures a deeper level of environmental consciousness in tourist behavior. It includes the grouping variable of overnight cost per capita and the antecedents of HP, CF knowledge, and EB. It indicates a more careful and well-thought approach in hotel selection that meets environmental standards and expectations (e.g., green hotels). Willingness to pay for a green levy seems the obvious expectation, regardless of whether calculated digitally or appropriated to an individual's behavior. This pathway appears to have the lowest coverage among the three solutions, yet it indicates a rather environmentally elitist clientele that considers environmental service attributes as an indispensable part of their experience quality. It reflects an attitude where tourists inherently select their hotel accommodation based on environmental and sustainability expectations (usually influenced by marketing activities, reviews, or word of mouth). As a result, they confirm the inherent intention to pay green levies aligned to the specific quality standard they have ascribed for (Dharmesti, Merrilees, and Winata 2020; González-Rodríguez, Díaz-Fernández, and Font 2020). Interestingly, this configuration did not include the antecedent of disposable income, possibly suggesting that for an environmetally conscious clientele, a carbon-controlled levy is more of an ethical and conscious priority than its associated cost. The success of this configuration presupposes a principled attitude of consciously reducing CF rather than comfortably paying for any associated levy.

The third final sufficient configuration captures the price–experience nexus, as in addition to the grouping variable of overnight cost per capita, it further considers the profile of the hotel, the disposable income of tourists, and their EB during their stay. The effect of the cost of living on tourism consumption has both direct and indirect implications of purchasing and paying predispositions (Nguyen, Thanh, and Nguyen 2022). The cost associated with a green service or product is a key predictor of consumer purchasing intention (Wu, Zhang, and Song 2024). This finding reiterates that perceived financial benefits always have incentivized green behaviors even during leisure and holiday periods (Yu et al. 2024). Tourists under this configuration perceive individually calculated CF digital apps as an opportunity to monitor and validate their EB through reduced CF compensations. Its contribution lies on the perspective that individually appropriated environmental levies can be used as a pathway for reduced hospitality CF, since financial challenges and uncertainty might trigger a greater behavioral consciousness around consumption patterns and associated CF decision-making. Furthermore, it confirms the understanding of the dependency of the price–experience nexus on income, especially for tourism services that are considered luxurious and thus characterized by high elasticity (Dang-Van 2023). In this perspective, green hotels and associated services may be considered more luxurious, leading to a reduction in purchasing intention, while in reality, they might structurally and operationally offer more opportunities for greener services and reduced CF levies.

6 | Managerial Implications

The fsQCA findings revealed three sufficient configurations that reflect three distinctive categories of hotel guest profiles: the pragmatist, the environmentally conscious, and the opportunist. These results could inform tourism and hospitality carbon offsetting efforts and respective management and marketing initiatives, particularly in times of tighter disposal income, which for the last few decades are the norm. Within the dynamics of the demand–supply relationship, tourism and hospitality businesses have the option to boost their green performance through either service adaptation or transformation processes. Without putting in jeopardy ethical or corporate responsibility standards, businesses should explore transparent and trustworthy alternatives of sustainability cost-sharing with their customers while ensuring service options that satisfy customer perceptions on the price–experience nexus and quality of experience (Gössling 2017). Managing innovation through the integration of technological, market, and organizational improvements is further aligned to the UN 2030 Agenda for inclusivity, fairness, and transparency.

It is important that both companies and destinations are sufficiently agile to endorse and utilize digital advancements to build transparency in their relationship with their clients and nurture a culture of co-commitment and co-responsibility toward the overall sustainability and carbon neutrality of the sector. Non-parametric analysis can deepen the understanding of the underlying complexity driving these dynamics and offer plausible trajectory directions that appeal to the different clientele markets. It is also vital to the survival of modern businesses that they make sufficient use of carbon scanning and identify the relevant signals. Such analysis can provide multiple ways to approach consumers and achieve higher profitability while also presenting opportunities to formulate bases for strengthening competitive advantage.

7 | Conclusions

This paper proposed three potential configurations as in perceptual and behavioral trajectories for hotel guests' willingness to compensate for their CF through individual behavior-calculated

carbon tracking apps. The study contributes to the body of literature examining the complexity of behavior-based pricing and sustainable tourist behavior related to the cost-sharing of carbon offsetting and innovation. It provides evidence concerning the importance of transparency, digital carbon literacy, and practicality around behavior-based CF levies. It could thus inform green service transformations and smart innovations while nurturing a culture of trust and co-ownership in carbon offsetting. Focusing on sustainability, it further highlights the significance of the experience of control (through digital means) that tourists enjoy achieving better experience for money. Methodologically it demonstrates the value of non-linear research approaches, such as fsQCA, for the examination of complex phenomena such as behavior-based levies through equifinality (multiple causal pathways leading to the same outcome).

Still, findings should be treated with caution, as the singular application of fsQCA in the context of behavioral sciences may compromise the depth and robustness of data richness around the nuances of human behavior. For many authors (e.g., Pappas and Woodside 2021; Ragin 2000; Yin and Yu 2022), fsQCA should be complemented with other methods, particularly interviews, to compensate for this limitation by ensuring that the chosen conditions (independent variables) are context-appropriate to reflect the complexity of the issue under study, to provide explanatory depth as to the reasons these configurations occur, to make sense of counterintuitive results, and to highlight the prioritization of conditions through the triangulation of findings. This current research was bound to the challenge of still limited adoption of self-calculation carbon apps by both tourists and hotels in Athens (in the informal discussions during the data collections, only a handful of participants had downloaded/or used such an app before). A follow-up research will endeavor to compensate for this limitation by integrating this mixed-method approach at different stages of the method: pre-fsQCA, to guide the construction of conditions and inform the calibration of fuzzy sets, and post-fsQCA, to refine and expand the identified causal pathways with evidence on the actual behavior and experience of participants versus their assumed willingness. These stages will enhance the sensitivity and reliability of the analysis, will mitigate the intention–action gap (Khan et al. 2024), and will provide more insightful configurations based on the actual experience of users but are subject to the broader collaboration with hotels that offer to pilot and adopt such services.

The research is also bound to the limitations of the period of data collection. The high temperatures and high overnight costs of the peak summer season in Athens could have compromised the participants predisposition to consider clearly around their EB and cost of their carbon offsetting. Research suggests that even environmentally conscious individuals demonstrate more relaxed behaviors during holidays (Chan 2021b). Running the research during a different period of the year might have yielded different attitudinal findings. Similarly, findings are contextually bound to the reality of urban Athenian hotels and their provision for smart and/or green services. A similar study in a destination where technology applications and green services have been more extensively embedded within the service provision (e.g., Asian destinations) or the consideration of multiple typologies or sizes of accommodation (e.g., Airbnb) could identify diverse configuration pathways that are useful for the extensive piloting of this idea.

To fully encapsulate the notions discussed in this paper, further research is required on the business perspective of cost-sharing in hotel carbon offsetting and their predisposition toward adopting digital and guest-controlled carbon apps. This will allow a better understanding of the challenges around managing transparent carbon and green initiatives in the sector. The need for product and service green innovations by means of self-controlled technologies seems to be an emerging priority in the sector, as it empowers both guests and suppliers to take ownership of their respective contribution to CF and allows more focused management and regulatory interventions.

Acknowledgements

The author would like to thank Prof Nikolas Pappas, University of Sunderland, for their support toward fsQCA analysis.

Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

Agag, G., A. Brown, A. Hassanein, and A. Shaalan. 2020. "Decoding Travellers' Willingness to Pay More for Green Travel Products: Closing the Intention–Behaviour Gap." *Journal of Sustainable Tourism* 28, no. 10: 1551–1575.

Arévalo, L. E. B., and A. Espinosa. 2015. "Theoretical Approaches to Managing Complexity in Organizations: A Comparative Analysis." *Estudios Gerenciales* 31: 20–29.

Baggio, R., and R. Sainaghi. 2011. "Complex and Chaotic Tourism Systems: Towards a Quantitative Approach." *International Journal of Contemporary Hospitality Management* 23, no. 6: 840–861.

Baradarani, S., and H. Kilic. 2018. "Service Innovation in the Hotel Industry: Culture, Behavior, Performance." *Service Industries Journal* 38, no. 13–14: 897–924.

Bickley, S. J., and B. Torgler. 2023. "Behavioural Economics: What Have We Missed? Exploring 'Classical' Behavioural Economics Roots in AI, Cognitive Psychology and Complexity Theory." In *Handbook of Research Methods in Behavioural Economics*, edited by S. J. Bickley and B. Torgler, 32–59. Edward Elgar Publishing.

Browne, M. W., and R. Cudeck. 1993. "Alternative Ways of Assessing Model Fit." In *Testing Structural Equation Models*, edited by K. A. Bollen and J. S. Long, 136–162. Sage.

Bryman, A. 2016. *Social Research Methods*. Oxford university press.

Burns, R. B., and R. A. Burns. 2008. *Business Research Methods and Statistics Using SPSS*. Sage.

Chan, E. S. 2021a. "Influencing Stakeholders to Reduce Carbon Footprints: Hotel Managers' Perspective." *International Journal of Hospitality Management* 94: 102807.

Chan, E. S. 2021b. "Why Do Hotels Find Reducing Their Carbon Footprint Difficult?" *International Journal of Contemporary Hospitality Management* 33, no. 5: 1646–1667.

Choi, A. S., and B. W. Ritchie. 2014. "Willingness to Pay for Flying Carbon Neutral in Australia: An Exploratory Study of Offsetter Profiles." *Journal of Sustainable Tourism* 22, no. 8: 1236–1256.

Dang-Van, T. 2023. "Emotional and Behavioral Responses of Consumers Toward the Indoor Environmental Quality of Green Luxury Hotels." *Journal of Hospitality and Tourism Management* 55: 248–258.

Dharmesti, M., B. Merrilees, and L. Winata. 2020. "'I'm Mindfully Green': Examining the Determinants of Guest Pro-Environmental Behaviors (PEB) in Hotels." *Journal of Hospitality Marketing & Management* 29, no. 7: 830–847.

D'souza, C., and M. Taghian. 2005. "Green Advertising Effects on Attitude and Choice of Advertising Themes." *Asia Pacific Journal of Marketing and Logistics* 17, no. 4: 51–66.

Foroughi, B., N. Arjuna, M. Iranmanesh, K. M. Kumar, M. L. Tseng, and N. Leung. 2022. "Determinants of Hotel Guests' Pro-Environmental Behaviour: Past Behaviour as Moderator." *International Journal of Hospitality Management* 102: 103167.

Franzoni, S. 2015. "Measuring the Sustainability Performance of the Tourism Sector." *Tourism Management Perspectives* 16: 22–27.

Glyptou, K. 2022. "Operationalising Tourism Sustainability at the Destination Level: A Systems Thinking Approach Along the SDGs." *Tourism Planning & Development* 21, no. 1: 1–27.

González-Rodríguez, M. R., M. C. Díaz-Fernández, and X. Font. 2020. "Factors Influencing Willingness of Customers of Environmentally Friendly Hotels to Pay a Price Premium." *International Journal of Contemporary Hospitality Management* 32, no. 1: 60–80.

Gössling, S. 2017. "Tourism, Information Technologies and Sustainability: An Exploratory Review." *Journal of Sustainable Tourism* 25, no. 7: 1024–1041.

Gunduz Songur, A., G. Turktarhan, and C. Cobanoglu. 2023. "Progress on Green Technology Research in Hotels: A Literature Review." *Journal of Hospitality and Tourism Insights* 6, no. 5: 2052–2072.

Hall, C. M., G. Prayag, and A. Amore. 2018. *Tourism and Resilience: Individual, Organisational and Destination Perspectives*. Vol. 5. Channel View Publications.

Higham, J., and G. Miller. 2018. "Transforming Societies and Transforming Tourism: Sustainable Tourism in Times of Change." *Journal of Sustainable Tourism* 26, no. 1: 1–8.

Hoffmann, S., W. Lasarov, H. Reimers, and M. Trabandt. 2024. "Carbon Footprint Tracking Apps. Does Feedback Help Reduce Carbon Emissions?" *Journal of Cleaner Production* 434: 139981.

Hu, L., and P. M. Bentler. 1999. "Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria Versus New Alternatives." *Structural Equation Modelling: A Multidiciplinary Journal* 6, no. 1: 1–55.

Huang, T. L. 2021. "Restorative Experiences and Online Tourists' Willingness to Pay a Price Premium in an Augmented Reality Environment." *Journal of Retailing and Consumer Services* 58: 102256.

INSETE Statistical Bulletin. 2024. "Monthly Statistical Data Reports (Online)." https://insete.gr/statistical-bulletin/?lang=en&sf_paged=2.

Khan, M. R. 2015. "Polluter-Pays-Principle: The Cardinal Instrument for Addressing Climate Change." *Laws* 4, no. 3: 638–653.

Khan, N., D. Acuti, L. Lemarie, and G. Viglia. 2024. "The Intention-Behaviour Gap in Sustainable Hospitality: A Critical Literature Review." *International Journal of Contemporary Hospitality Management* 36, no. 5: 1627–1646.

Kim, J. 2016. "An Extended Technology Acceptance Model in Behavioral Intention Toward Hotel Tablet Apps With Moderating Effects of Gender and Age." *International Journal of Contemporary Hospitality Management* 28, no. 8: 1535–1553.

Kim, J. H. 2014. "The Antecedents of Memorable Tourism Experiences: The Development of a Scale to Measure the Destination Attributes Associated With Memorable Experiences." *Tourism Management* 44: 34–45.

Kline, R. B. 2010. *Principles and Practice for Structural Equation Modelling*. 3rd ed. Guildford Press.

Köseoglu, M. A., M. Altin, E. Chan, and O. F. Aladag. 2020. "What Are the Key Success Factors for Strategy Formulation and Implementation? Perspectives of Managers in the Hotel Industry." *International Journal of Hospitality Management* 89: 102574.

Lee, S. 2018. "Enhancing Customers' Continued Mobile App Use in the Service Industry." *Journal of Services Marketing* 32, no. 6: 680–691.

Li, X., K. J. Li, and X. Wang. 2020. "Transparency of Behavior-Based Pricing." *Journal of Marketing Research* 57, no. 1: 78–99.

Lv, W. D., D. Tian, Y. Wei, and R. X. Xi. 2018. "Innovation Resilience: A New Approach for Managing Uncertainties Concerned With Sustainable Innovation." *Sustainability* 10, no. 10: 3641.

Mittiga, R. 2019. "Allocating the Burdens of Climate Action: Consumption-Based Carbon Accounting and the Polluter-Pays Principle." *Transformative Climates and Accountable Governance*: 157–194.

Morosan, C., and A. DeFranco. 2016. "Modeling Guests' Intentions to Use Mobile Apps in Hotels: The Roles of Personalization, Privacy, and Involvement." *International Journal of Contemporary Hospitality Management* 28, no. 9: 1968–1991.

Moscardo, G. 2021. "Using Systems Thinking to Improve Tourism and Hospitality Research Quality and Relevance: A Critical Review and Conceptual Analysis." *Tourism and Hospitality* 2, no. 1: 153–172.

Munro, P., S. Kapitan, and B. Wooliscroft. 2023. "The Sustainable Attitude-Behavior Gap Dynamic When Shopping at the Supermarket: A Systematic Literature Review and Framework for Future Research." *Journal of Cleaner Production* 426: 138740. https://doi.org/10.1016/j.jclepro.2023.138740.

Nguyen, C. P., S. D. Thanh, and B. Nguyen. 2022. "Economic Uncertainty and Tourism Consumption." *Tourism Economics* 28, no. 4: 920–941.

Nickerson, N. P., J. Jorgenson, and B. B. Boley. 2016. "Are Sustainable Tourists a Higher Spending Market?" *Tourism Management* 54: 170–177.

Nimri, R., A. Patiar, and X. Jin. 2020. "The Determinants of Consumers' Intention of Purchasing Green Hotel Accommodation: Extending the Theory of Planned Behaviour." *Journal of Hospitality and Tourism Management* 45: 535–543.

Norman, G., and D. Streiner. 2008. *Biostatistics: The Bare Essentials*. 3rd ed. Decker.

Nunnally, J. C. 1978. *Psychometric Theory*. 2nd ed. McGraw-Hill.

Olya, H. G., and A. Al-Ansi. 2018. "Risk Assessment of Halal Products and Services: Implication for Tourism Industry." *Tourism Management* 65: 279–291.

Olya, H. G., L. Altinay, and G. De Vita. 2018. "An Exploratory Study of Value Added Services." *Journal of Services Marketing* 32, no. 3: 334–345.

Olya, H. G., and J. Mehran. 2017. "Modelling Tourism Expenditure Using Complexity Theory." *Journal of Business Research* 75: 147–158.

Palumbo, R., M. F. Manesh, M. M. Pellegrini, A. Caputo, and G. Flamini. 2021. "Organizing a Sustainable Smart Urban Ecosystem: Perspectives and Insights From a Bibliometric Analysis and Literature Review." *Journal of Cleaner Production* 297: 126622.

Pappas, I. O., and A. G. Woodside. 2021. "Fuzzy-Set Qualitative Comparative Analysis (fsQCA): Guidelines for Research Practice in Information Systems and Marketing." *International Journal of Information Management* 58: 102310.

Pappas, N. 2017. "The Complexity of Purchasing Intentions in Peer-To-Peer Accommodation." *International Journal of Contemporary Hospitality Management* 29, no. 9: 2302–2321.

Pappas, N., and K. Glyptou. 2021. "Accommodation Decision-Making During the COVID-19 Pandemic: Complexity Insights From Greece." *International Journal of Hospitality Management* 93: 102767.

Park, S., and Y. Huang. 2017. "Motivators and Inhibitors in Booking a Hotel via Smartphones." *International Journal of Contemporary Hospitality Management* 29, no. 1: 161–178.

Pizzi, S., A. Caputo, A. Corvino, and A. Venturelli. 2020. "Management Research and the UN Sustainable Development Goals (SDGs): A Bibliometric Investigation and Systematic Review." *Journal of Cleaner Production* 276: 124033.

Ragin, C. C. 2000. *Fuzzy-Set Social Science*. University of Chicago Press.

Ragin, C. C., and J. Sonnett. 2004. "Between Complexity and Parsimony: Limited Diversity, Counterfactual Cases and Comparative Analysis." In *Vergleichen in der Politikwissenschaft, VS Verlag fur Sozialwissenschaften*, edited by S. Kropp and M. Minkenberg, 180–197. Springer.

Rico, A., J. Martínez-Blanco, M. Montlleó, et al. 2019. "Carbon Footprint of Tourism in Barcelona." *Tourism Management* 70: 491–504.

Rosato, P. F., A. Caputo, D. Valente, and S. Pizzi. 2021. "2030 Agenda and Sustainable Business Models in Tourism: A Bibliometric Analysis." *Ecological Indicators* 121: 106978.

Sainaghi, R., and R. Baggio. 2017. "Complexity Traits and Dynamics of Tourism Destinations." *Tourism Management* 63: 368–382.

Sanchez, J., L. Callarisa, R. M. Rodrıguez, and M. A. Moliner. 2006. "Perceived Value of the Purchase of a Tourism Product." *Tourism Management* 27, no. 3: 394–409.

Schermelleh-Engel, K., H. Moosbrugger, and H. Müller. 2003. "Evaluating the Fit of Structural Equation Models: Test of Significance and Descriptive Goodness-of-Fit Measures." *Methods of Psychological Research* 8, no. 2: 23–74.

Skarmeas, D., C. N. Leonidou, and C. Saridakis. 2014. "Examining the Role of CSR Skepticism Using Fuzzy-Set Qualitative Comparative Analysis." *Journal of Business Research* 67: 1796–1805.

Tarnanidis, T., N. Owusu-Frimpong, S. Nwankwo, and M. Omar. 2015. "A Confirmatory Factor Analysis of Consumer Styles Inventory: Evidence From Greece." *Journal of Retailing and Consumer Services* 22: 164–177.

Varnali, K. 2019. "Understanding Customer Journey From the Lenses of Complexity Theory." *Service Industries Journal* 39, no. 11–12: 820–835.

Weston, R., and P. A. Gore Jr. 2006. "A Brief Guide to Structural Equation Modeling." *Counseling Psychologist* 34, no. 5: 719–751.

Wang, J., S. Wang, Y. Wang, J. Li, and D. Zhao. 2018. "Extending the Theory of Planned Behavior to Understand Consumers' Intentions to Visit Green Hotels in the Chinese Context." *International Journal of Contemporary Hospitality Management* 30, no. 8: 2810–2825.

White, K., R. Habib, and D. J. Hardisty. 2019. "How to SHIFT Consumer Behaviors to Be More Sustainable: A Literature Review and Guiding Framework." *Journal of Marketing* 83, no. 3: 22–49.

Woodside, A. G. 2013. "Moving Beyond Multiple Regression Analysis to Algorithms: Calling for Adoption of a Paradigm Shift From Symmetric to Asymmetric Thinking in Data Analysis and Crafting Theory." *Journal of Business Research* 66, no. 4: 463–472.

Woodside, A. G., and M. Zhang. 2013. "Cultural Diversity and Marketing Transactions: Are Market Integration, Large Community Size, and World Religions Necessary for Fairness in Ephemeral Exchanges?" *Psychology and Marketing* 30, no. 3: 263–276.

World Tourism Organization. 2023. *Climate Action in Tourism—An Overview of Methodologies and Tools to Measure Greenhouse Gas Emissions*. UNWTO. https://doi.org/10.18111/9789284423927.

Wu, H., H. Zhang, and H. Song. 2024. "Are Chinese Willing to Pay for Travel Carbon Offset Products?" *Journal of Sustainable Tourism*: 1–22. https://doi.org/10.1080/09669582.2024.2336493.

Wu, P. L., S. S. Yeh, T. C. Huan, and A. G. Woodside. 2014. "Applying Complexity Theory to Deepen Service Dominant Logic: Configural Analysis of Customer Experience-and-Outcome Assessments of Professional Services for Personal Transformations." *Journal of Business Research* 67, no. 8: 1647–1670.

Yin, S., and Y. Yu. 2022. "An Adoption-Implementation Framework of Digital Green Knowledge to Improve the Performance of Digital Green Innovation Practices for Industry 5.0." *Journal of Cleaner Production* 363: 132608.

Yu, W., X. Liao, S. Ji, and F. Cui. 2024. "Green Rewards vs. Non-Green Rewards? The Impact of Hotel Marketing Incentives on Guests' Green Consumption Intentions." *Journal of Sustainable Tourism*: 1–19. https://doi.org/10.1080/09669582.2024.2378190.

Zahra, A., and C. Ryan. 2007. "From Chaos to Cohesion—Complexity in Tourism Structures: An Analysis of New Zealand's Regional Tourism Organizations." *Tourism Management* 28, no. 3: 854–862.