

Article

Green Marketing Strategies on Online Platforms: A Mixed Approach of Experiment Design and Topic Modeling

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Abstract: This study aimed to examine the effects of two types of green information conveyed via online platforms and the moderating role of environmental consciousness on customers' green perceptions, positive attitudes, and behavioral intentions. This study performed a 2 (firm-initiated green information: absent, present) $\times$ 2 (customer-generated green information: absent, present) experiment. These mixed methods were further implemented by using both open-ended surveys and structured measurements. Open-ended survey answers were analyzed with structural topic modeling to discover customers' green perceptions. The results highlighted the importance of customer-generated green information to support firm-initiated green marketing, consequently leading to enhanced customer satisfaction and behavioral intentions. Although displaying green information generated by both the company and its customers is effective in enhancing green perceptions, customers may react differently depending on their levels of environmental consciousness.

Keywords: green; restaurants; experimental design; online intervention; consciousness



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1. Introduction

With the growing public awareness of how unsustainable corporate activities negatively impact societal wellbeing, maintaining and communicating corporate social responsibility (CSR) has become imperative across all industries [1]. Many hospitality firms have engaged in socially responsible practices to respond to the demands and expectations that various stakeholder groups place on them [2]. By aligning their business practices with stakeholders' expectations and conveying that congruence through CSR initiatives, companies aim to obtain legitimacy, which is essential for the survival of the business [3].

To maintain legitimacy, firms need to effectively communicate to their stakeholders their efforts to implement socially responsible practices, with clear and effective communication to customers being, perhaps, most important of all [4,5]. With the advent of Web 2.0, many companies have utilized online platforms, such as websites and social networks, for promoting their business practices and engaging their customers [4,6]. The development of a massive number of public online spaces has facilitated digital communication with the public, freed from the barriers of time and space [7–10]. As a result, today's stakeholders can easily find information and evaluate companies' efforts to adhere to evolving social norms and values [11,12]. CSR communication through online channels tends to appeal to conscious customers, and it may, in turn, foster a positive public image of the firm [13,14].

However, firms that share their practices excessively via online channels may be criticized as self-serving or untrustworthy [13]. To reduce customer skepticism and build stakeholders' trust, researchers have advised firms to include stakeholders' opinions on their online communication platforms rather than using firm-initiated content exclusively [15,16]. Customers no longer passively agree with firm-generated public relations information; they instead actively create content that endorses or disapproves of firms' claims [12]. These

consumer-generated reviews stand in stark contrast to unilateral corporate communications embodying positive messages and pro-firm information [17].

Customers' perceptions and attitudes are influenced by internal or personal factors; people may perceive the same content or stimuli differently depending on their psychological traits [18,19]. People tend to pay more attention and evaluate information more positively when they believe such information is highly relevant to their interests [20]. In the environmental CSR sphere, customers who are environmentally conscious are more likely to care about information related to a company's environmental accomplishments. Contrarily, customers with low involvement or interest in environmentally friendly/CSR practices may not seek or critically evaluate such information; they are, therefore, less likely to change their attitudes or behavioral intentions even after processing the pro-firm green information [21–23].

Previous studies have examined customers' responses to sustainable practices and their influences on customers' attitudes and behavioral intentions for revisit or word-of-mouth praise [24–26]. However, there is a lack of research classifying effective communication strategies to enhance customers' green perceptions and behavioral intentions, especially on online platforms. Therefore, researchers need to make efforts to investigate information strategies to bolster green perceptions and decrease customers' skepticism about the CSR activities undertaken by hospitality companies. To address the aforementioned issues, this study aimed (1) to investigate the effects of two types of green messages on social media platforms on customer perceptions, attitudes, and behavioral intentions and (2) to explore the moderating role of environmental consciousness.

This research advances previous scholarship in several ways. Most of the previous literature employed standardized measurement items with various measurements, such as semantic differential scales or Likert-type scales [24–26]. While these structured measurements serve as good references when recalling prior experiences, customers may not be able to express their responses to unique context-specific attributes if such attributes were not included in the survey [27]. Hence, this study adopted mixed methods, using both open-ended surveys and structured measurements to capture customers' natural perceptions toward information on sustainable restaurant practices. Furthermore, the authors utilized computer-assisted content analysis and structural topic modeling to analyze open-ended surveys (free responses from participants), enhancing the reproducibility and objectiveness of the data analysis [28].

2. Literature Review

2.1. Existing Studies about CSR

Most CSR research on customers in the hospitality industry has employed quantitative research methods. Researchers examining CSR-related customer perceptions have mainly investigated intercausal relationships using survey research, interviews, longitudinal studies, interventions, experimental designs, and so on. Based on theories being developed and/or tested, researchers have explored mechanisms for understanding the antecedents that affect outcome variables in CSR-related topics. They have investigated indirect and/or moderating relationships of interest, such as the impact of demographic characteristics on customers' perceptions [29]. Recent studies have focused on examining how consumer skepticism decreases and what drives such reductions. In recent times, studies have begun to investigate customers' green/CSR experiences in green/CSR facilities using data from online-review sites. Methods have been developed specifically for the purpose of measuring customer perceptions, moving past traditional approaches (such as content and econometric analyses using variously accessible secondary data) to new text-mining techniques.

Hospitality researchers have also focused on investigating the inter-relationships between CSR and employee responses/perceptions [30]. In terms of topics within the restaurant sector, previous studies have investigated CSR towards customers focusing on safety and food-borne illnesses, the use of local and green products, disclosure of

nutritional information and labeling, and the availability of restaurant healthy menus [31]. Such related studies are summarized in Table 1.

Table 1. Overview of recent relevant literature on corporate social responsibility (CSR)/green online reviews in the hospitality industry.

Author(s), (Publication Year)	Title	Description	Methodology
D’Acunto et al. [32]	Do consumers care about CSR in their online reviews? An empirical analysis	Customers’ perceptions about hotel CSR using TripAdvisor hotel reviews	Automated text analysis
Sung et al. [33]	Restaurant chain’s corporate social responsibility messages on social networking sites: The role of social distance	CSR messages on SNS	SEM and between-subject experimental design
Kucukusta et al. [34]	CSR communication strategies and stakeholder engagement of upscale hotels in social media	CSR communication through social media	Qualitative and quantitative approaches
Merli et al. [35]	Why should hotels go green? Insights from guests experience in green hotels	The relationship between guest perceptions of hotel green practices and behavioral intentions	PLS-SEM analysis
Ettinger et al. [36]	Online CSR communication in the hotel industry: Evidence from small hotels	CSR-certified hotels using TripAdvisor reviews	Qualitative content analysis
Calheiros et al. [37]	Sentiment classification of consumer-generated online reviews using topic modeling	Sentiment classification, eco-hotel, and consumer-generated online reviews	Latent Dirichlet allocation topic modeling

2.2. Prior Studies of Online Reviews in the Hospitality Industry

In order to measure online consumer reviews, various methodologies have been employed. Recently, there have been efforts to examine qualitative content by employing text mining within the hospitality context (Table 2). There remain under-researched veins investigating CSR initiatives and customers’ perceptions using text-mining techniques, especially with open-ended surveys within the restaurant context.

The use of user-generated critical content (e.g., online reviews) is beneficial in terms of retrieving a large volume of customers’ natural responses expressed in texts [38]. Given rapid changes in industry trends and the broad diversification in customer thinking, unstructured texts are valuable for discovering meaningful patterns of consumer perceptions [39]. However, only limited types of metadata are available for user-generated content, making causal inference difficult. For instance, most online websites do not reveal detailed information about the physical conditions of businesses or demographic information about review-writing customers. Recently, a few studies have attempted to employ mixed approaches, such as combining big data analytics (i.e., topic modeling) and traditional methods (e.g., content analysis, open-ended surveys), to analyze user-generated restaurant reviews [40,41]. Grounded in the progress of such methodologies, this study implemented an experiment that combined open-ended surveys with structured measurements. This approach enables researchers to catch freely recalled and prominent restaurant attributes that customers perceive while also examining various reactions triggered by customers’ personal traits.

To embrace the strengths of machine learning, the current study employed topic modeling—specifically, structural topic modeling (STM)—as an alternative to the manual human coding of text data [28]. Topic modeling has proven suitable to extract semantically meaningful dimensions within a short amount of time and without the interference of the

subjective interpretations of researchers [39,42,43]. In addition, STM has various capacities to test covariate effects. Therefore, this method should be favored for social-science studies over many other techniques, such as latent Dirichlet allocation (LDA), which has become increasingly popular in the past few years [44]. Nonetheless, only limited studies have adopted this method in the hospitality literature.

Table 2. Summary of prior studies of online reviews in the hospitality industry.

Author(s), (Publication Year)	Description	Methodology	Context
Chatterjee [45]	Helpfulness of online hotel reviews (i.e., TripAdvisor)	Sentiment and emotion mining approach	Hotel
Hu, Zhang, Gao and Bose [44]	Customer dissatisfaction and online hotel reviews	Structural Topic Model	Hotel
Li, et al. [46]	Impacts of temporal, explanatory, and sensory cues on customers' perceived usefulness and enjoyment toward restaurant online reviews (e.g., Yelp.com)	Text mining approach and econometric analysis	Restaurant
Gao, et al. [47]	Competitor identification, online reviews, and the restaurant industry	Competitive analysis	Restaurant
Bilgihan, et al. [48]	Restaurant satisfiers and dissatisfiers, and online reviews	Qualitative (data visualization technique) and quantitative (MANOVA) data analysis	Restaurant
Xu and Li [49]	Customer satisfaction and dissatisfaction, types of hotels, and online customer reviews	Latent semantic analysis	Hotel
Kim, et al. [50]	Customer overall ratings, guests served per labor hour, food quality, and restaurant performance	Survey	Restaurant
Tsao, et al. [51]	Review valence, review quantity	Experiment	Hotel

2.3. Green Communication on Social Media Platforms

The growth in the hospitality industry has birthed numerous industry-impacting social media platforms, such as TripAdvisor, which are frequented by stakeholders (i.e., former and potential customers). Former customers express their views about hospitality-related products and/or services on these platforms, while potential customers seek recommendations from those who already have experienced the offerings. In addition to their opinions and experiences with products or services, these customers express their opinions on firms' sustainable practices after experiencing green/CSR practices [52]. Furthermore, social media platforms have helped shepherd the industry into green practices, such as with TripAdvisor's initiation of its Green Leaders Program [53]. This program helps customers understand the green/CSR practices of the hospitality companies they search for on TripAdvisor.

Hospitality industry professionals are aware of the environmental concerns shared by an increasing number of customers, concerns that lead customers to make specific outreach appeals focused on the sustainable, natural, and green corporate initiatives [54]. According to Font and Lynes [55], these initiatives can connote honesty and social responsibility, enhancing both corporate reputations and customers' eagerness to engage with a brand or business. Since customers form a green image for specific brand based on the green practices that they have observed, a company-led promotion of such practices may be essential for maximizing positive effects of firms' green efforts on the customers' brand images [56]. Belz [57] suggested that web-based channels, such as social networking sites, websites, and blogs, can serve as green marketing tools by promoting corporate-level advocacy for environmental issues. Many hospitality firms actively use such social media

platforms to promote their green initiatives [58]. Yet, little is known about the effectiveness of firm-initiated online green marketing in the hospitality context. Thus, the following research question (RQ) was developed:

RQ1: Does firm-initiated green practice information sharing on online platforms influence potential customers' perceptions, attitudes, and behavioral intentions?

Recent studies have indicated that customers do not respond uniformly to corporate efforts to promote environmental sustainability [59]. Though they may honestly believe in and care about CSR programs, some customers may view company-led communication of sustainability practices with skepticism because they suspect an ulterior motive of self-serving and/or corporate greenwashing [13]. This greenwashing is defined as "the selective disclosure of positive information about a company's environmental or social performance, without full disclosure of negative information on these dimensions, so as to create an overly positive corporate image" [60] (p. 9). Customers who suspect greenwashing may assume that companies selectively present positive information only, hiding practices that may negatively impact environments [14]. Lee, Oh, and Kim [15] warned against a "self-promoter's paradox", stating that while firm-initiated green communications can enhance customer awareness, they may also lead to accusations of greenwashing. Hospitality firms need to be aware of this CSR dilemma and engage in activities that will be perceived by customers as both socially responsible and properly motivated.

Sustainability or green-practice-related information that is generated by customers may be a potential solution to this problem. Today's customers no longer need to rely on corporate-initiated communications to learn about firms' sustainable practices. They can, instead, directly access the experiences of fellow customers. As the online reviews are created by other consumers, audiences consider this information more relevant and truthful than firm- or marketer-generated information [61]. The reference group theory provides a foundation for this phenomenon, wherein customers trust the content generated by fellow customers [41,62]. This theory posits that people feel a sense of belonging to a community that contains attributes similar to themselves [63]. As potential customers are likely to find similarities with other customers who have shared opinions on digital media after experiencing products and/or services, they may perceive customer-generated content to be more reliable and persuasive [64]. Furthermore, potential customers may be more likely to be influenced by review content written by fellow customers than firm-generated content [41,62].

Based on this discussion, the following research questions are proposed:

RQ2: Does green practice information posted by customers on online platforms influence customers' perceptions, attitudes, and behavioral intentions?

RQ3: Does firm-initiated green practice information sharing have a stronger impact on customers' perceptions, attitudes, and behavioral intentions when green practice information posted by customers on online platforms is presented via online platforms?

2.4. The Moderating Role of Customers' Environmental/Green Consciousness

Consumers' environmental, or green, consciousness refers to "the degree to which consumers are concerned about environmental problems and are willing to exert efforts to purchase green products" [65] (p. 485). Similarly, based on the value-attitude-system model, Dembkowski and Hanmer-Lloyd [66] conceptualized environmental consciousness as "a multidimensional construct with a cognitive, affective, and conative component" (p. 594). The cognitive component indicates customers' knowledge or thoughts about the environmental issue, which influence the information processing and attitudes toward an object. As environmental consciousness grows, customers develop a greater sensitivity about the world around them; these attitudinal and awareness changes then manifest as behavioral changes [67].

Previous studies have also reported that customers who were highly involved in environmental issues had strong opinions about environmentally friendly products or

services and tended to favor them [22,68]. Customers who are environmentally conscious are also prompted to search for and process environmental information [69]. The affective component in the value-attitude-system refers to feelings or emotional responses associated with environmental issues [66]. These affective reactions, such as guilt, joy, and pride, arise from self-consciousness and have been widely tested [21,70].

Finally, the conative component is the tendency to engage in pro-environment behavior to make a personal contribution to the environment. The idea of environmental consciousness indicates one's inclination to provide green/CSR-related responses. For example, individuals endowed with a higher level of environmental consciousness demonstrate greater environmental/CSR commitment, perception, and responses. Empirical evidence has confirmed that conscious customers made sustainable purchase decisions [71–73].

In previous studies related to environmentally friendly/CSR practices, researchers found that environmental consciousness served as a moderating factor [74]. Environmental consciousness moderates the relationships of personal factors and individuals' perceptions [75]. The previous research found that the significant role of green consciousness as a moderator in the interrelationship among restaurants' green attributes, customers' attitude, and behavioral intentions [68]. Therefore, this research aimed to discourse the following research question:

RQ4: Do the relationships listed above (RQ1, 2, 3) differ depending on customers' environmental consciousness?

Based on that understanding, the research framework designed to investigate the above-mentioned questions is illustrated in Figure 1.

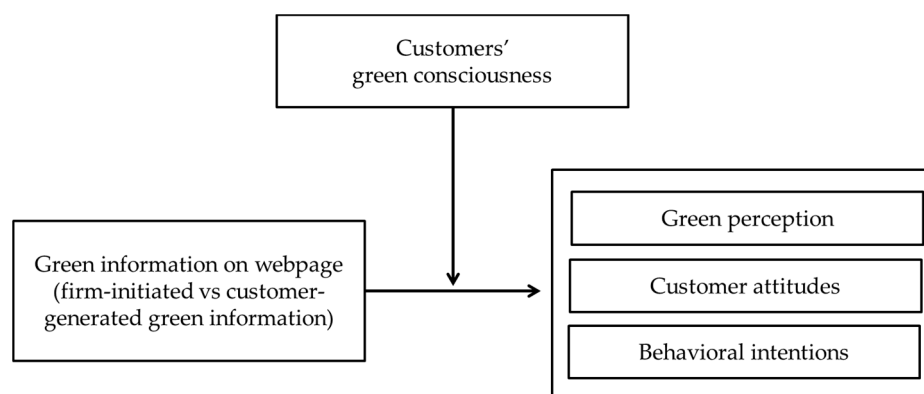


Figure 1. The conceptual framework.

3. Subjects and Methods

3.1. Design and Stimuli

To find answers to the aforementioned research questions, the authors developed an experiment with a 2 (firm-initiated green information: absent, present) $\times$ 2 (customer-generated green information: absent, present) between-subjects factorial design. To capture customers' natural responses, stimuli similar to that on the actual TripAdvisor webpage, a well-known customer review website, were developed (See Figure 2; left side). These stimuli contained general information about a typical restaurant, such as restaurant business information, price, menus, and online reviews. In order to manipulate the firm's green claims and customers' green discourses, descriptions of green restaurant attributes were added in a business features section (firm-initiated green information) and/or in online reviews (customer-generated green information). The manipulated parts of the website are presented in Figure 2. Descriptions of green restaurant attributes were modified from a previous study by Namkung and Jang [22].

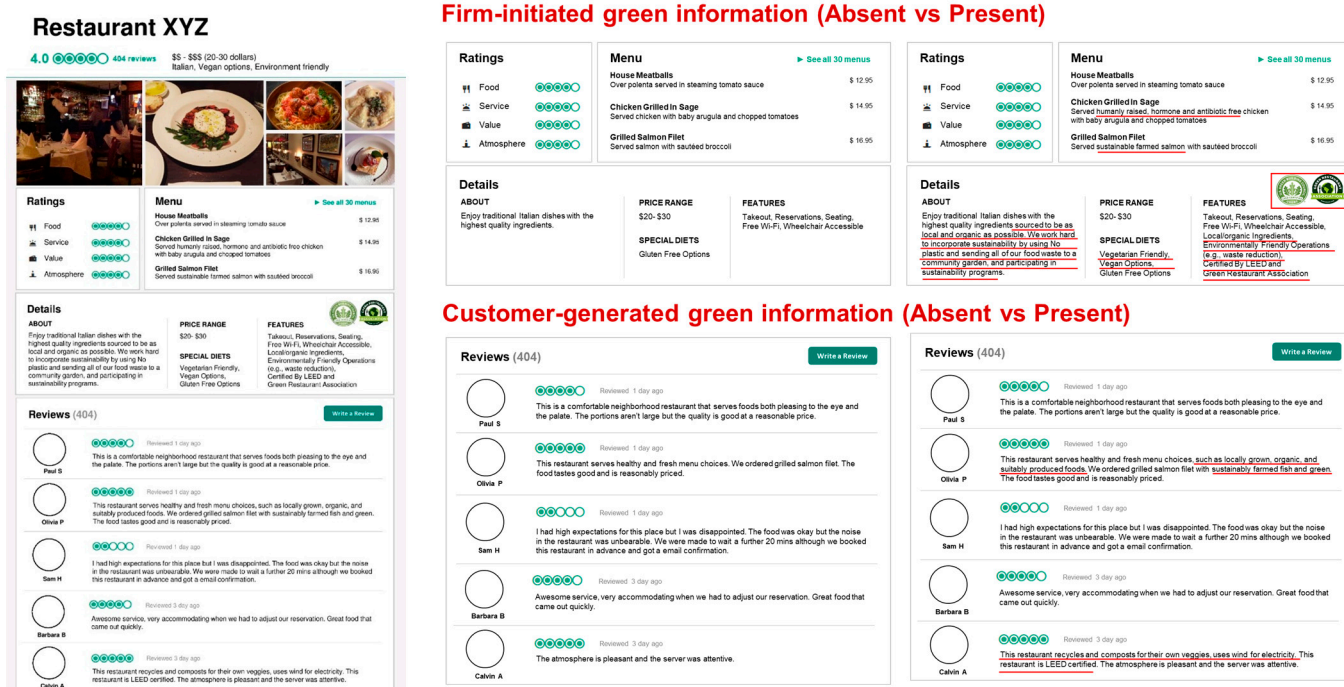


Figure 2. Firm-initiated and customer-generated information manipulations.

3.2. Research Participants and Data Collection Procedures

Participants for the main study were recruited from Amazon Mechanical Turk (MTurk). Due to the fact that participants were requested to complete open-ended surveys in written English, we recruited only adult participants (18 years or older) whose first language was English. Also, no personal information was gathered so as to protect the privacy of participants. Hence, an institutional review board approved an exemption from further review as this study design was considered to cause minimal risk of psychological and physical harm. Both the pilot test and the main surveys were collected in July 2019.

To reduce the variances attributed to the familiarity of online review websites, potential participants who relied on online review sites when choosing a restaurant were selected. This filtering process was achieved through the following question: “When you choose a restaurant in an unfamiliar location, which of the following describes you the best?” Only participants who selected the answer “I search online and look for restaurants with good reviews (TripAdvisor, Yelp, etc.)” were able to continue with the survey. Among 1503 participants who started the survey, 830 participants met sample selection criteria, passed multiple attention checks, and finished the survey.

These 830 participants were randomly divided into the four experimental conditions. Participants were asked to imagine they were planning to dine at a restaurant and had decided to use a consumer review website to get information about the restaurant. Before participants reviewed the stimuli, a description of the restaurant (i.e., a full-service restaurant that has an average guest check between \$20 and \$30) was provided to control the variances of customer perceptions based on the type of restaurant [22]. The stimuli contained a lot of information, including texts and pictures. Therefore, participants were required to review the stimuli screen for at least 90 s and then complete three attention-check questions, which asked them to match information from the text and visuals of the website. Those who successfully passed the attention checks proceeded to answer three open-ended survey questions regarding their perceptions about the restaurant they had viewed. Then, participants answered questions about their environmental consciousness, attitudes, and behavioral intentions, after which they provided their demographic characteristics, such as age, highest level of education, race/ethnicity, and household income.

3.3. Measures

Customers' green perceptions were measured using three open-ended questions, adapted from Echtner and Ritchie [63]: "What images or characteristics came to mind when you reviewed the website for Restaurant XYZ?", "How would you describe the atmosphere or mood that you would expect to experience while visiting Restaurant XYZ?", and "Please list any distinctive or unique images or characteristics when you think of Restaurant XYZ." Participants were asked to write their thoughts in full sentences, with minimum word counts set at 400 characters. Overall attitude was measured by this question from Stylos, et al. [64]: "Please rate below your overall image of Restaurant XYZ as a place to dine", with 1 being very negative and 7 being very positive. Behavioral intention was assessed with a three-item construct adapted from Ryu, et al. [65]: "After reviewing the website, I would visit this restaurant", "I would visit this restaurant more frequently than other restaurants", and "I would recommend this restaurant to my friends or others", using a 7-point scale (1: strongly disagree to 7: strongly agree; Cronbach's $\alpha = 0.91$). In order to test the moderating effect of customers' self-perception, environmental consciousness was measured with a five-item construct, adapted from Tarkiainen and Sundqvist [66], on the same 7-point scale (Cronbach's $\alpha = 0.86$).

3.4. Data Analysis

To test the manipulation and the main experiment, an analysis of covariance (ANCOVA) test was performed with the statistical significance level at 0.05. For the main experiment, four types of green restaurant stimuli (i.e., websites with no green information, firm-initiated green information, customer-generated green information, and both firm-initiated and customer-generated green information) were used as an independent variable after controlling for participants' gender, education, and income. We used three dependent variables: customers' green perceptions, overall attitudes, and behavioral intentions. Customers' green perceptions were derived by analyzing open-ended survey results about the restaurants that they reviewed in the experiment. The full sentences that the survey participants wrote were then analyzed using topic modeling. More detailed information about the topic-modeling investigation is provided in Section 3.5. The other two dependent variables, overall attitude and behavioral intention, were assessed with 7-point Likert scales. The moderating effects of environmental consciousness were tested via the interactions between environmental consciousness and the four types of restaurant websites.

3.5. Topic Modeling

Unstructured texts gathered from the open-ended surveys were then analyzed with a structural topic model (STM), R-based topic modeling [28]. This method was adopted as an alternative to the traditional manual coding method for qualitative data. Before performing topic modeling, data cleaning (e.g., converting to lowercase, lemmatizing, creating bigrams, removing non-English characters and stopwords) was performed with the natural language toolkit Gensim in Python.

After reviewing the quality of the extracted topics using different numbers of topics, the final topic model was built for both the pilot and main tests. Among the topics extracted from STM, those that contained participants' perceptions of green practices were used to measure green perception.

The topic model was built with nine topics. Out of these nine, two topics were closely related to green practices, accounting for 21.2% of total topic proportion on average. One green topic was customers' perceptions toward sustainable food options (top words: vegan, friendly, option, environment), accounting for a 10.8% proportion on average. The other green topic regarded environmentally friendly practices (top words: compost, wind, electricity, recycle), accounting for 10.4% of the total topic proportion.

The validity of the topic model was evaluated by comparing the two green topics across the four different experiment setups. The one group that reviewed the website with neither firm- nor customer-generated green information ($M_{\text{no green information}} = 0.07$) had signifi-

cantly lower green topic proportions compared to others ($M_{\text{firm-initiated green info only}} = 0.20$, $M_{\text{customer-generated green info only}} = 0.23$, $M_{\text{both}} = 0.32$; $p < 0.001$). Although some participants were not exposed to any green information, the sum of the two green topics was not zero for this group, for the following reason: as the machine calculates the probability of the document's being relevant to each topic, even a document that does not contain any green practice content has a very low green topic proportion. To address this issue, previous studies set a cut-off for topic proportion (0.10, 1%) so as to determine whether a document is relevant to the particular topic [67,68]. Topic proportions of the participants who reviewed the website with no green information were lower than the cut-off value, which confirms the validity of these green topics to measure green perceptions.

The summary of the methodology is summarized in Figure 3.

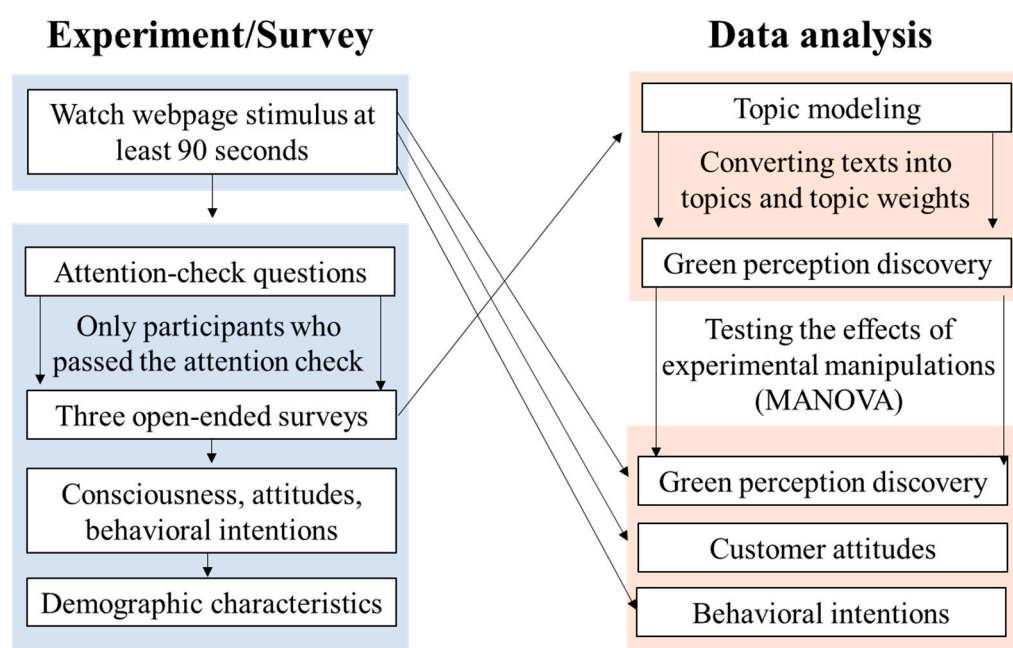


Figure 3. Experiment design and data analysis.

4. Results

4.1. Manipulation Checks

Pretests were performed to evaluate the effectiveness of the stimuli with 74 participants from Amazon Mechanical Turk (MTurk). Participants were asked to answer two questions: (1) whether they recognized restaurant-provided information regarding green practices and (2) whether they recognized customer reviews regarding green practices. Out of 49 participants who reviewed the stimuli with the firm's green claims, 48 participants (98.0%) recognized the firm's green claims on the website. For the stimuli with customer reviews related to green practices, 50 out of 54 people (92.6%) answered that they recognized the information. The realism of the stimuli was also checked, and participants stated the website was realistic ($M = 6.16$; 1: Unrealistic to 7: Realistic) and believable ($M = 6.11$, 1: Unbelievable to 7: Believable). Therefore, manipulation was successful.

4.2. Main Study

Out of 830 total participants, the majority of participants were female (52.8%), had a household income between \$35,000 and \$55,000 (24.1%), and had a bachelor's degree (43.0%). The average age was 36.5 years old.

A multivariate analysis of covariance test was performed to test the manipulation, with the ANCOVA results presented in Table 3 and Figure 4. After controlling for participants' gender, education, and income, firm-initiated green information had a significant multivariate

effect, $F = 22.14$, $p < 0.001$, $\eta^2 = 0.075$. ANCOVA results indicated that the firm-initiated green information significantly influenced customers' green perceptions ($F = 65.78$, $p < 0.001$, $\eta^2 = 0.074$) but had no significant impacts on overall attitude and behavioral intention. Among participants who reviewed the website with firm-initiated green information, green practice topics accounted for nearly 28% of their answers ($M = 0.28$). However, the proportion of green topics was only 14% among those who reviewed the website without firm-generated green information ($M = 0.14$). In other words, customers proved more likely to talk about green practices when a firm had posted green practice information on its website.

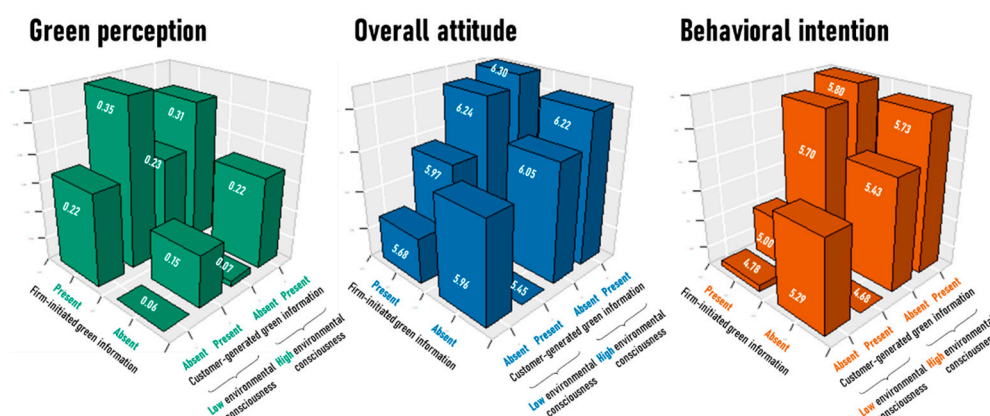


Figure 4. Interaction plots.

Customer-generated green information had a significant multivariate effect, $F = 11.64$, $p < 0.001$, $\eta^2 = 0.041$. Like firm-initiated green information, customer-generated green information significantly influenced green perceptions ($F = 33.72$, $p < 0.001$, $\eta^2 = 0.040$), but no influences were observed in the overall attitude and behavioral intention. Participants who reviewed the website containing customer-generated green information were more likely to talk about green practices ($M = 0.26$) than those who reviewed the website without it ($M = 0.16$).

The interaction between firm-initiated and customer-generated green information significantly influenced overall attitude ($F = 8.25$, $p < 0.01$, $\eta^2 = 0.010$) and behavioral intention ($F = 6.28$, $p < 0.05$, $\eta^2 = 0.008$). If customer-generated green information was presented without firm-initiated green information, participants had a more negative attitude ($M = 6.08$) and lower behavioral intention ($M = 5.49$) than when there was no green information on the website ($M = 5.82$, $M = 5.19$; attitude and behavioral intention, respectively). If firm-initiated green information was present on the website, participants who reviewed the website with customer-generated green information had a more positive attitude ($M = 6.13$) and higher behavioral intention ($M = 5.39$) than without customer-generated green information ($M = 5.96$, $M = 5.21$; attitude and behavioral intention, respectively).

In terms of the moderating effects of customers' environmental consciousness, only the three-way interactions among firm-initiated green information, customer-generated green information, and participants' environmental consciousness had significant multivariate effects, $F = 2.62$, $p < 0.05$, $\eta^2 = 0.010$. The three-way interactions are displayed in Figure 3. Results showed that the influence of the type of stimulus on green perceptions was stronger than the degree of environmental consciousness. Regardless of the level of consciousness, the participants who reviewed the website containing both firm-initiated and customer-generated green information had high topic proportions ($M_{\text{low consciousness}} = 0.35$, $M_{\text{high consciousness}} = 0.31$). Naturally, both participants with high and low environmental consciousness mentioned green practices the least when they reviewed the website with no green information ($M_{\text{low consciousness}} = 0.06$, $M_{\text{high consciousness}} = 0.07$).

Table 3. Tests of between-subjects effects.

	DV	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Effects of Experimental Manipulations							
Firm-initiated info	Green perception	2.739	1	2.739	65.776	0.000	0.074
	Overall attitude	1.165	1	1.165	1.498	0.221	0.002
	Behavioral intention	0.271	1	0.271	0.214	0.644	0.000
Customer-generated info	Green perception	1.404	1	1.404	33.715	0.000	0.040
	Overall attitude	0.234	1	0.234	0.301	0.584	0.000
	Behavioral intention	0.490	1	0.490	0.386	0.534	0.000
Firm-initiated $\times$ Customer-generated	Green perception	0.000	1	0.000	0.002	0.966	0.000
	Overall attitude	6.415	1	6.415	8.247	0.004	0.010
	Behavioral intention	7.957	1	7.957	6.277	0.012	0.008
Moderation Effects of Consciousness							
Environmental consciousness	Green perception	0.033	1	0.033	0.787	0.375	0.001
	Overall attitude	30.350	1	30.350	39.019	0.000	0.046
	Behavioral intention	87.324	1	87.324	68.888	0.000	0.078
Firm-initiated info $\times$ Consciousness	Green perception	0.181	1	0.181	4.339	0.038	0.005
	Overall attitude	0.109	1	0.109	0.140	0.709	0.000
	Behavioral intention	1.269	1	1.269	1.001	0.317	0.001
Customer-generated info $\times$ Consciousness	Green perception	0.027	1	0.027	0.645	0.422	0.001
	Overall attitude	0.956	1	0.956	1.229	0.268	0.002
	Behavioral intention	2.923	1	2.923	2.306	0.129	0.003
Firm-initiated info $\times$ Customer-generated info $\times$ Consciousness	Green perception	0.015	1	0.015	0.368	0.544	0.000
	Overall attitude	5.605	1	5.605	7.206	0.007	0.009
	Behavioral intention	6.963	1	6.963	5.493	0.019	0.007

Unlike green perception, overall attitude and behavioral intention were largely influenced by the level of environmental consciousness. Except for the participants who reviewed the website with no green information, the average scores of overall attitude and behavioral intention were higher among the participants with higher levels of environmental consciousness than for those with lower levels. It is interesting to note that the participants with low environmental consciousness displayed less favorable attitudes when they viewed the website containing green information (e.g., $M_{\text{firm-initiated green info only}} = 5.97$, $M_{\text{customer-generated green info only}} = 5.45$) than the website with no green information ($M_{\text{no green information}} = 5.96$). A similar pattern was found with behavioral intention. Among the participants with low environmental consciousness, those who viewed the website with green information (e.g., $M_{\text{firm-initiated green info only}} = 4.78$, $M_{\text{customer-generated green info only}} = 4.68$) had lower behavioral intentions than those who viewed the website with no green information ($M_{\text{no green information}} = 5.29$).

5. Discussion

There is empirical evidence showing that green messages are capable of influencing customers' perceptions and behavior intentions. For instance, Muranko, et al. [76] confirmed the role of audiovisual forms of communication in encouraging people to change their perceptions toward circular product perceptions, bolstering engagement in pro-circular behaviors in the retail sector. Turunen and Halme [77] proposed a role for comprehensive information about the sustainable practices, a communication tool letting consumers know about the sustainable options they can choose. Moreover, providing green information can be utilized to educate both consumers and service providers about the nature of sustainability [77]. Hence, this study aimed to identify an effective strategy to deliver green information to raise customers' perceptions toward green practices and change their attitudes and behavioral intentions in the restaurant context. Furthermore, we investigated whether customers who are conscious about environmental issues pay more attention to green information than others by testing the moderating effects of customer consciousness and green information.

We designed the experiments with four different stimuli, each one a green restaurant website containing green information derived from a combination of the company itself or prior customers. The findings of this study indicate that websites containing a single source of green information, whether generated by restaurants themselves or by fellow customers, can influence green perceptions, but not overall attitudes and behavioral intentions. However, websites that contain both firm-initiated and customer-generated green information can change overall attitudes and behavioral intentions. da Luz, et al. [78] found that how green messages are framed—whether the messages are believable or not—can influence consumers' perceptions and behaviors. In line with this argument, the source of green information (i.e., firm-generated vs. customer-generated) may be related to the believability of the information. That is, providing green information from both sources can increase the trustworthiness assigned to the information, making it a more effective means of changing attitudes and behavioral intentions.

We also found that green information becomes more persuasive for those who are already conscious of environmental issues; they tend to have more positive attitudes and behavioral intentions after the intervention of reviewing green information on the website. Chamberlin and Boks [79] argued that green messages can promote a variety of interests and motivations that may lead to behavior change. After reviewing the green messages displayed in the digital sphere, those researchers proposed that online green messages can become a motivator to reify various personal interests. Similarly, messages featuring green information may align neatly with the personal beliefs of customers who care about the environment, raising their positive emotions and driving their intentions to act sustainably.

5.1. Theoretical Implications

In this study, we found that both firm-initiated promotions about green practices and fellow customers' discourses on green practices contributed to increasing customers' green perceptions. Although the input of either firm-initiated or customer-generated green information alone did not change customers' attitudes or behavioral intentions, when both were presented together, attitudes and behavioral intentions were positively affected. This finding is reasonable, as when only firm-initiated green promotion is implemented and made visible to customers, customers' awareness toward green practices can be enhanced, but skepticism about the company may also be present [69]. Moreover, companies can be blamed for being selfish if they engage in self-promotion too excessively [70]. Other customers' green discourse can ameliorate such negative publicity of green practice information as customer-initiated discourse can serve to endorse the firm's green practices [71]. Accordingly, balancing green information from both the company and its stakeholders becomes more persuasive in changing customer behavior than the input of firm-initiated green promotions alone.

Although these results support the effectiveness of green information, customers' personal interests, such as environmental consciousness, clearly play a significant role in the relationship between green practice communication and customer attitudes and behavioral intentions. Congruity theory can be the theoretical ground for this finding as it states that the congruency between self-image and the stimuli can create positive and affective reactions [72]. In the green restaurant context, customers with high environmental consciousness developed a more positive attitude and stronger behavioral intention from green information because the self-congruent green attributes activated positive responses [73].

On the other hand, customers with low environmental consciousness had the most positive attitudes and strongest behavioral intentions when they received no information related to green restaurant practices from the website. This discovery is not wholly novel—there are several viewpoints related to the negative impact of green information on customer attitudes and behavioral intentions among customers with low environmental consciousness. As suggested by Kollat and Farache [14], customers with low involvement in sustainability issues may find green topics to be irritating. Previous studies have also reported that customers may hold negative stereotypes of green firms or products, such as their inferior quality or higher price [74,75]. Thus, the current research findings confirm the important role of personal values and self-concepts on the evaluation of green marketing [76].

5.2. Practical Implications

The use of green marketing on an online platform can be a double-edged sword. As customers are getting more conscious about social and environmental issues, many customers are seeking sustainability-related information before making purchase decisions [13]. Hence, flagrant green marketing may appeal to customers who are highly conscious about environmental issues in the positive manner. However, firm-initiated green marketing may produce adverse outcomes by triggering customer skepticism and negative perceptions about the green products (such as higher prices or inferior quality), particularly among customers with low environmental consciousness. To overcome such green marketing pitfalls, targeting environmentally conscious customers is important. Restaurateurs may want to promote their operations to online communities or via Internet channels specialized for environmentally conscious customers. In addition, it is recommended that operators encourage customers to share their thoughts about green practices on such online platforms. Unlike with traditional media, two-way communication between a company and its customers is possible online. Firms should make an effort to co-create the green information displayed across their online platforms with customers to make green information more noticeable and influential on positive attitudes and behavioral intentions.

5.3. Limitations and Future Research

There are some limitations to this study. Although we aimed to overcome the limitations of structured measurements by incorporating open-ended surveys, the findings may have been influenced by social desirability bias as the authors could not fully conceal the focus of the experiment. Reviewing natural responses of customers (e.g., consumer reviews) may minimize this social desirability bias. Also, this study only considered the effects of positive customer-generated green information that supports firm-initiated green information. However, customers' perceptions, attitudes, and behavioral intentions may differ depending on the latent sentiment in customer-generated green information. In an actual online communication context, customer-generated green information is difficult for firms to monitor, let alone control, and thus, such information must be expected to contain mixed opinions and sentiments. Therefore, a future study may choose to test the effects of positive and negative user-generated information. Finally, this study was performed with only English-speaking participants. Therefore, the results may be difficult to generalize to those customers who communicate in different languages. In the future, cultural influences on green information processing may be examined.

6. Conclusions

As an increasing number of companies incorporate environmentally friendly/CSR practices into their operations, efficient and effective communication across online platforms becomes critical. This study provides insights into online green marketing strategies for customers with different personal values in the green restaurant context. To do so, this study integrated text mining as an analytic method at the basis of an experimental design to discover natural customer perceptions in the green restaurant setting. With this method, qualitative data (i.e., texts from open-ended surveys) were transformed into quantitative data so that causal inference could be derived from the qualitative dataset.

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