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Economic vs. ecological benefit for organic food: the role of perceived values in online consumer reviews

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Introduction: With the growing awareness of sustainable development, organic food has been favored by consumers due to its advantages in both human health and environmental sustainability. However, the economic and ecological values of organic food have been two factors that consumers weigh. Online reviews, as an important source of data for capturing consumers' perceived value, especially the temporal information of reviews, provide new opportunities for revealing the dynamic impact of consumers' perceived value on satisfaction.

Methods: Based on 63,674 online reviews, this study utilizes structural topic modeling to identify the specific dimensions of consumers' perceptions of economic and ecological values of organic food, and incorporates multiple linear regression modeling to explore the specific effects of these perceived values on consumer satisfaction and their dynamic trends.

Results: The results of the study indicate that consumers' perceptions of both economic and ecological values significantly enhance their satisfaction with organic food. Further, this study found that the positive effect of perceived ecological value on consumer satisfaction increased over time, while the positive effect of perceived economic value on consumer satisfaction gradually weakened.

Discussion: This study theoretically provides a new research idea to identify consumer perceived value based on online review data, and reveals the dynamic impact of perceived value on satisfaction, adding a new perspective for sustainable consumption research. Practically, this study provides an important reference for the marketing and product optimization of the organic food industry, especially in terms of dynamic consumer behavior analysis and market positioning.

KEYWORDS

perceived economic value, perceived ecological value, consumer satisfaction, online reviews, organic food

1 Introduction

Food consumption has been identified as a major contributor to several environmental challenges, including pesticide use, greenhouse gas emissions, water depletion, soil degradation and declining water quality (Notarnicola et al., 2012). In response to the harmful effects of conventional agriculture on the environment and human health, the public is increasingly turning to organic foods, which are considered eco-friendly (Danner and Menapace, 2020; Hemmerling et al., 2015). The rapid growth of e-commerce has led to an exponential increase in online sales (Zhao et al., 2019). Online purchasing of organic food has been facilitated by

the rapid development of e-commerce (Li et al., 2023). Moreover, the rapid development of e-commerce platforms has created a new business ecosystem for customer connection and interaction (Wang, 2024). The development of e-commerce platforms has not only made consumers the beneficiaries of interactive marketing, but also value creators themselves. Consumers can communicate and interact with sellers, other buyers, and platform administrators in multiple directions through online review features (Jiang et al., 2022; Liao et al., 2023; Li et al., 2024; Nangpiire et al., 2022; Zhang et al., 2023). The direct communication between multiple stakeholders accelerates the interactive marketing process and allows for more efficient and effective transactions (Wang, 2024). Based on the content of consumers' online interactions, it is able to reveal user experience perceptions (Bai et al., 2023). User experience and response are considered important references for guiding product improvement and making innovative decisions (Rathore and Ilavarasan, 2020). Therefore, revealing user experience perceptions from organic food consumers' online interactive content is essential to maintain and deepen the interactive relationship with organic food consumers and to realize the value creation and marketing of organic food.

Due to the complexity of the production process, organic foods can be more expensive than conventional foods, and the benefits in terms of health and environmental improvements may take longer to realize (Li et al., 2023). Furthermore, it has also been shown that the cost of green products can often be a barrier to green purchasing behavior (China Agricultural University, 2018). The higher price of organic food as a green product can discourage consumers from purchasing organic food. In conclusion, both economic and ecological factors directly influence consumers' purchasing decisions and constitute the main motivations for their choice of organic food. Therefore, an in-depth understanding of consumers' perceptions of the economic and ecological values of organic food is essential to guide the marketing of organic food. In addition, social cognitive theory suggests that a person's internal cognitive processes not only shape his or her perceptions and understandings of things, but also subtly guide and determine his or her actual actions (Fiske et al., 2007). Consumers' actual perceptions of organic food ultimately translate into two behaviors, convergence and avoidance of organic food. Consumer satisfaction with organic food is a key predictor of these behaviors and a key condition for consumers to trust the product and develop brand loyalty (Lakatos et al., 2021; Moliner and Tortosa-Edo, 2024). According to Expectation Disconfirmation Theory, consumer satisfaction is based on an individual basis on the comparison of their pre-purchase expectations of a product and their actual perception of the product or service (Oliver et al., 1997). According to the theory of expectation disconfirmation, consumers compare their actual perceived economic and ecological values of organic food with their expected expectations, which ultimately has a significant impact on satisfaction. In conclusion, revealing the two aspects of perceived economic value and perceived ecological value that affect consumers' satisfaction with organic food is of great value to organic food operators in maintaining sustained consumer satisfaction and improving the performance of organic food in response to market competition.

In the field of organic food consumption, economic values, can increase consumers' trust and willingness to buy organic food (Watanabe et al., 2020). Consumers will have a positive attitude toward organic food because of its ecological value (Roh et al., 2022). In addition, perceived food quality, price fairness, and perceived

economic value have a positive effect in the presence of customers' revisit and word-of-mouth intentions toward organic food restaurants (Department of Business Administration, 2019). Although the perceived economic value and perceived ecological value of organic food have been explored in depth in the existing literature, unfortunately, the existing literature seldom deals with the intrinsic link between these two factors and satisfaction with organic food, which undoubtedly limits the current in-depth understanding of consumers' true feelings and evaluations of organic food. Based on the above analyses, the first two research questions of this study are posed: (1) Are both the economic and ecological values of organic foods key factors in consumer satisfaction? (2) Which has a greater impact on consumer satisfaction, perceived economic value or perceived ecological value? In addition, research on perceived ecological value and perceived economic value of organic food has mostly studied consumer attitudes toward these two perceived values from a static perspective, with less consideration given to the dynamic changes in consumer attitudes toward perceived value. For business marketers, it is crucial to grasp the changing trend of consumers' attitudes toward products. Therefore, the third research question of this study is proposed: (3) How do the effects of perceived economic value and perceived ecological value on consumer satisfaction change over time?

Most previous studies have obtained consumers' value perceptions of organic food through questionnaire surveys of consumers (Department of Business Administration, 2019; Roh et al., 2022; Watanabe et al., 2020), and have neglected to obtain value perceptions from consumers' online interactive information (e.g., review content). Questionnaire surveys usually use structured questions, which facilitate the systematic collection of specific information and facilitate quantitative analysis. However, they are limited by biases in survey design or subjective responses from respondents, as well as relatively small amounts of data. Questionnaire surveys that take into account temporal changes in consumer preferences need to be divided into segments, which is time consuming and labor intensive. E-commerce platforms provide interactive channels for consumers, sellers, and platform managers, and consumers comment on the platforms with their own perceptions of their experiences in the consumption process, making themselves participants in the value creation of organic food. Due to its open structure, online text comments provide more authentic customer experiences and perceptions (Berezina et al., 2016). Overall satisfaction with online reviews and the overall customer experience are reflected in the ratings left by consumers (Luo et al., 2012). In addition, consumer online review data contains the date of the review, which is more convenient to study and predict the dynamic trend of consumer attitudes than with questionnaires, and the large amount of review data can obtain more accurate data support for research conclusions. In the organic food value creation process, deriving value perceptions from consumers' online reviews is key to transforming a product- and company-centric view into a personalized and interactive customer experience.

In summary, this study addresses the three research questions posed above through an in-depth analysis of online review data. Specifically, this study evaluates consumer reviews of organic food products using structural topic modeling, an unsupervised machine learning approach in text mining technology, to discover and quantify consumers' perceived economic value and ecological value. Then, the study uses multiple linear regression modeling to assess the dynamic influence mechanisms of perceived economic value and ecological value on customer satisfaction. Finally, based on the results of the

study, recommendations are provided for policy makers, organic food producers, and e-commerce platforms to encourage food purchasing behavior in green consumption.

This study differs from previous studies in several key aspects. Firstly, this study found that perceived economic value had a greater positive impact on consumer satisfaction than perceived ecological value. However, over time, the positive impact of perceived ecological value on consumer satisfaction was increasing, and conversely, the positive impact of perceived economic value was decreasing. The conclusions imply that consumer interest in ecological value is increasing. This study enriches the theoretical research on perceived economic value and perceived ecological value of organic food. Secondly, it provides a new perspective for determining consumers' perceived economic and ecological value of organic food. This study deeply mined the text data of the reviews to obtain that consumers' perceived economic value of organic food contains two aspects of perceived activity intensity and product cost-effectiveness, while the perception of ecological value is expressed in two aspects of the organic characteristics of the product and health value. Finally, we combine qualitative text mining with quantitative analysis to reveal the dynamic influence of consumers' perceived economic value and perceived ecological value of organic food on consumer satisfaction from online review data, providing a comprehensive analytical framework for mining the perceived value of organic food from reviews. Overall, this study provides a new research idea for identifying consumers' perceived value based on online review data in theory, and reveals the dynamic impact of perceived value on satisfaction, adding a new perspective to sustainable consumption research. In practice, this study provides an important reference for marketing and product optimization in the organic food industry, especially in the analysis of dynamic consumer behavior and market positioning.

2 Literature review and hypotheses development

2.1 The theory of consumption values

Sheth et al. (1991) introduced the theory of consumption values, explaining why consumers opt for specific products. This succinct theory provides a comprehensive framework for assessing consumers' perceived value from various perspectives (Sheth et al., 1991). Perceived value is defined as the consumer's overall evaluation of a product's utility (Sheth et al., 1991; Zeithaml, 1988). Perceived value is therefore viewed as a compromise between what customers receive and what they spend (Bhattacharyya et al., 2023). Scholars are divided on the dimensionality of consumer-perceived value in different scenarios. The acknowledged green perceived value dimensions in the field of sustainable consumption research are biosphere value, self-centered value, altruistic value, and hedonistic value (Steg et al., 2014). The foundation for sustainable consumption, according to Koller et al. (2011), is ecological value, which gives rise to value judgments such as social, economic, emotional, and functional value dimensions.

Since consumer value is derived from the consumer's encounter with a good or service, which results in a multisensory and context-based assessment process, we have adopted a multidimensional approach to consumer value in this study (Holbrook, 1994). Perceived

ecological and perceived economic values are the two aspects of Perceived value of organic food that we examine. In contrast, perceived ecological value is defined as benefits that support the growth of living things' long-lasting, healthy, and sustainable relationships with one another and with their physiochemical environment (Bhattacharyya et al., 2023; Lindsey and Gillson, 2001; Siebeneicher and Bock, 2022). Perceived economic value is concerned with the net utility derived from the quality attributes of a product or service and the price of the product (Lin and Huang, 2012).

2.2 Expectation disconfirmation theory

This research also builds on the expectation disconfirmation theory, positing that customer satisfaction is determined by the gap between consumers' initial expectations and their subsequent perceptions of product or service quality (Oliver et al., 1997). In other words, customer satisfaction is a subjective assessment that is created on an individual basis by customers based on a comparison of their pre-buy expectations with the product and their overall experience during the purchase process (Oliver et al., 1997). Expectations represent the consumer's anticipation or forecast regarding a product or service's future performance (Higgs et al., 2005). Formed before consumption, these expectations result from a cognitive process that considers the attributes of products and services. Post-consumption, consumers evaluate their experience based on these expectations, feeling satisfied when the outcome meets or exceeds them, and dissatisfied if it does not (Oliver et al., 1997; Zhuo et al., 2023).

According to the expectation disconfirmation theory, customer satisfaction with environmentally friendly products hinges on how well these products meet consumers' sustainability expectations and desires for eco-friendly options (Chen, 2010). Furthermore, achieving satisfaction with these green offerings is crucial for fostering brand loyalty and trust, and plays a pivotal role in predicting sustainable consumption behaviors (Lakatos et al., 2021; Moliner and Tortosa-Edo, 2024). This implies that businesses can raise customer happiness and mood about their existing offerings by enhancing the quality of their products or services, which will encourage customers to repurchase them (Román-Augusto et al., 2022). The more satisfied consumers are with organic food as a green product, the more inclined they are to trust and recommend it (Li et al., 2023). Understanding public perceptions, evaluations, and satisfaction with organic food can empower governments and businesses to implement more effective strategies to encourage the purchase of sustainable food products.

2.3 The effect of perceived economic value

The economic value of products and services lies in the balance of their quality attributes and price (Lin and Huang, 2012). In sustainable consumption, this value mirrors the practical benefits perceived in eco-friendly goods or services, offering both economic advantages (Jan et al., 2019; Sangroya and Nayak, 2017). Economic value combines product quality and price value, which helps solve consumer problems at a reasonable cost (Zhang et al., 2023). According to the cost-effectiveness economic concept, people prefer lower-cost products (Ma et al., 2022). Consumers encounter critical factors such as food quality and pricing while purchasing organic

food (Roh et al., 2022). Price plays a crucial role in defining the economic value of organic food, with customers favoring affordably priced options (Watanabe et al., 2020). The perceived value formed by the economic benefits obtained during the purchase or use of organic food by consumers positively influences attitudes and willingness to purchase organic food (Roh et al., 2022; Woo and Kim, 2019). Consumer satisfaction in an online purchasing environment is positively influenced by utilitarian criteria such as cost-effectiveness (Zhuo et al., 2023). According to Luo et al. (2022), consumers are satisfied with energy-efficient appliances if they believe they are of high quality and reasonably priced. If consumers perceive a product as having a high economic value, they are more likely to be satisfied because the needs and preferences that satisfy them are being met. Therefore, we propose the following hypothesis:

H1: Perceived economic value significantly increases consumer satisfaction with organic food.

2.4 The effect of perceived ecological value

Perceived ecological value refers to the perception and evaluation of the benefits that a product or service represents in terms of promoting healthy interactions between organisms and their physical and chemical environments (Bhattacharyya et al., 2023; Lindsey and Gillson, 2001; Siebeneicher and Bock, 2022). Consumers' perceived ecological value is reflected in their concern for environmental protection and health. Organic food production avoids the use of chemical pesticides, herbicides, synthetic fertilizers, sewage sludge, bioengineering, and ionizing radiation (Tian et al., 2022). As a result, organic food helps to improve human health while also preserving the physical and chemical environment in which living things exist. Consumers are increasingly opting for organic food over conventional items because of its health and environmental advantages (Roh et al., 2022). Existing research on green consumption indicates that ecological value has a major impact on green purchase behavior (Chaihanchai and Anantachart, 2023). Consumer perceptions of ecological values drive purchase intentions for green products (Kautish et al., 2019), including organic foods (Sadiq et al., 2020). The health attributes of a product significantly influence purchasing decisions for organic items, with a positive correlation between the perceived health benefits of the food and the attitude toward it (Ghazali et al., 2017; Xie et al., 2015; Yin et al., 2016). In other words, the health benefits of green products (e.g., organic food) are likely to influence purchasing decisions and attitudes toward them. In addition, the assumption that purchasing green products will help reduce pollution, conserve resources, and benefit the environment is positively associated with green shopping (Upadhyay and Kamble, 2023). Consumers who buy energy-saving goods may assume they are helping to protect the environment, conserve energy, and promote green beliefs (Lin and Huang, 2012). Customers are more inclined to choose green products when they recognize their significant ecological benefits (Laudien et al., 2023). Luo et al. (2022) found a positive link between the ecological value of products and consumer satisfaction with energy-efficient goods. Consumers, as ecosystem stakeholders, have positive impressions and satisfaction with organic food items when they understand the health and environmental benefits. Based on this, we proposed the following hypotheses:

H2: Perceived ecological value significantly increases consumer satisfaction with organic food.

2.5 The moderating effect of time

Customers' expectations may evolve dynamically, influenced by their past experiences and perceptions (Boulding et al., 1993; Zhuo et al., 2023). According to the expectation disconfirmation theory, customer satisfaction is a personal subjective rating produced by consumers by comparing their total experience during the buying process to their expectations of the goods before purchase (Oliver et al., 1997). As a result, just as expectations alter dynamically in response to cumulative experiences and perceptions, so does customer satisfaction. In green consumption, green products often command higher prices due to their eco-friendly features, such as energy efficiency, environmental preservation, resource-saving, and health benefits (Peattie, 2010). However, it may take some time for the ecological benefits they provide to become apparent (Li et al., 2023). Therefore, we infer that as the product is used for a longer period of time, the ecological benefits of organic food (such as environmental protection and health improvement, etc.) begin to appear, which will gradually deepen consumers' understanding of the ecological benefits, and will raise consumers' expectations of the ecological value of organic food, which will in turn expand the impact of the ecological value of organic food on consumer satisfaction.

Existing research implies a link between customers' concerns or perceptions about the ecological characteristics of green products and time. The acquisition of ecological features in green products frequently entails sacrifices and concessions on other attributes, such as pricing (Newman et al., 2014). Other research has demonstrated that choosing green products provides customers with positive utility perceptions, notwithstanding any actual or perceived quality downsides. These utilities include the positive experiences that green product consumers have through perceived ecological value associated with environmental protection, as they believe that their purchasing decisions will have a positive ecological impact (Hughner et al., 2007; Magnusson et al., 2003). In general, over time, consumers will place more emphasis on the ecological qualities of a product and less emphasis on its economic attributes. This shift leads to the seemingly reasonable hypothesis in this study.

H3: The positive impact of perceived economic value on consumer satisfaction becomes weaker over time.

H4: The positive impact of perceived ecological value on consumer satisfaction is getting stronger over time.

3 Data and methodology

Therefore, this study adopted a structural topic model to extract the topics of consumers' reviews of organic food products in order to capture the consumers' perceived value hidden in unstructured big data, and to explore the impact of perceived economic value and perceived ecological value on consumer satisfaction. Specifically, we capture online reviews of five organic food products from January 1, 2019 to December 31, 2023 and then clean them into an

experimental dataset. Then, an unsupervised machine learning technique structured topic model is used to capture consumers' perceived economic value and perceived ecological value from the text. Finally multiple linear regression models were used to investigate the dynamic effects of perceived economic value and perceived ecological value on consumer satisfaction.

3.1 Data collection and data preprocessing

3.1.1 Sample selection

Organic food is grown and prepared in line with organic agricultural concepts, practices, and standards, and it is certified by organic food certification organizations (Bosona and Gebresenbet, 2018). The main focus of this study was to obtain and analyze online review data of organic food on the Jingdong e-commerce platform. The process of research object selection included a keyword-based search for the names of organic food products that consumers often purchase in their daily lives, followed by a meticulous examination of product detail pages to verify the presence of organic certification labels. Only those commodities clearly displaying the organic certification label were selected for further study. Finally, a total of five organic food products, such as organic fruits, organic vegetables, organic rice, and organic meat, were collected for this study, taking into account the quantity and quality of data.

3.1.2 Data sources and collection

This study used Octopus Collector to collect online comments about organic food from the JD.com e-commerce platform as the main source of data. There are three reasons why the Jingdong e-commerce platform's online comments were chosen as the main data source for this article: (1) Jingdong e-commerce platform is one of the largest B2C online shopping malls in China. It provides consumers with a rich product selection of organic food and a convenient shopping experience. (2) The "2022 Organic Category Consumption Trend White Paper" released by Jingdong shows that compared to the growth rate of the entire organic industry in the omni-channel, the annual growth rate of Jingdong's organic food consumption is 4.5 times higher than that of the omni-channel organic food, and Jingdong has become an important organic food sales platform. (3) Jingdong has extensive traffic exposure and a robust customer review system, resulting in a high user engagement rate. This gives Jingdong a clear advantage in terms of the quality and quantity of online reviews about organic food.

The specific data collection process is as follows: first, we retrieve five organic food products such as organic fruits, organic vegetables, organic rice and organic meat on the Jingdong platform. We selected the products with high sales volume and queried the detail pages, and

only the products with organic certification labels in the detail pages were selected as our research objects. Second, we copy all the links of the products that meet the research object to the automatic crawling task of Octopus. Finally, we exported the original review information. A total of 65,553 review data of five organic food products sold on the Jingdong e-commerce platform were collected in this study, forming a comprehensive dataset. The data were collected from January 1, 2019, to December 31, 2023, respectively. The dataset includes reviewer IDs, review dates, review content, and ratings. Each review is treated as a document, and together they form an extensive corpus that represents an aggregation of all documents.

3.1.3 Data preprocessing

Data preprocessing is carried out after the data collection is completed. Online reviews posted by consumers on e-commerce platforms are more colloquial and do not have a standardized structure or uniform format. Data cleansing and preprocessing are critical steps to ensure the accuracy and credibility of the study before subsequent analysis. Data cleaning and preprocessing of the collected data was performed in the following steps. First, this study uses python to weed out duplicate content and useless data. There will be default positive reviews on the platform, or each person manually copy and paste the content of other people's reviews. Analyzing this part of the data will have an interfering effect on the mining of potentially valid information in the review data, so this part of the data needs to be eliminated. Second, delete too short sentences. When a review text contains more corpus, the richer the content expressed in this review. On the contrary, when a review text contains more corpus, then the content expressed in this review is often unclear and has no practical meaning. For example, "very good," "very great," "not bad," etc., which are common phrases consisting of two or three words, are not helpful for data analysis. This study can effectively improve the data quality of textual reviews by deleting such phrases. Finally, since Chinese reviews are in sentence form, computers cannot recognize this form. Therefore, natural language processing techniques must be utilized to preprocess the document into a machine-readable format. Specifically, this study utilizes the jieba package in Python to slice the Chinese text into word forms that are compatible with the unsupervised text mining technique (i.e., structural topic modeling) that is subsequently used. In addition, the text will contain words that appear frequently but do not have a clear meaning, such as intonational auxiliaries, prepositions, adverbs, and other words. If these words are used too much, precise results may not be obtained, affecting the subsequent analysis. Therefore, these words are filtered by constructing a deactivation lexicon. The partial presentation of the results before and after the word division process after adding the deactivated word list is shown in Table 1.

TABLE 1 Partial display of review text results before and after segmentation processing.

Original review	A review after the process of splitting words
不错,有机的,环保有营养 Nice. Organic. Environmentally friendly and nutritious.	有机(Organic) 环保(Environmentally friendly) 营养(nutritious)
为营养健康买单, 自律饮食的第96天 Paying for Nutritional Health, Day 96 of a Self-Directed Diet	营养(Nutrition) 健康(Healthy) 买单(Buying) 自律(Self-discipline) 饮食(Diet)
价格比较实惠, 很便宜, 品质也不错 The price is more affordable, it's cheap and the quality is good.	价格(Price) 实惠(Affordable) 便宜(Cheap) 品质(Quality)

TABLE 2 The number of online reviews before and after data preprocessing.

Product name	Before data preprocessing (number of data)	After data preprocessing (number of data)
Organic rice	15,960	15,612
Organic milk	20,563	20,137
Organic meat	10,732	10,512
Organic vegetable	9,713	9,174
Organic fruit	8,585	8,239
Aggregate:	65,553	63,674

After undergoing these processing steps, the final corpus of consumer comments was formed for subsequent analysis, consisting of 63,674 valid data entries. Table 2 shows the organic food review data after data cleaning and preprocessing.

3.2 Structural topic modeling

3.2.1 The illustration of STM

Structural Topic Modeling (STM) is a Bayesian generative probabilistic model that uses words in a text and co-occurring relationships between those words to perform unsupervised topic mining and outputs a set of words with a high probability of concurrency, i.e., topics (Büschken and Allenby, 2016). Structural Topic Modeling (STM) is a Bayesian generative probability model that utilizes the words in a text and the co-occurrence relationship between these words to perform unsupervised topic mining. The goal is to identify the main topics within the text’s content in a detailed and accurate manner, particularly from a vast amount of textual data. By quantifying all the expressed topics in the text as constituent probabilities, STM enhances the interpretability of text data. The main advantage of STM over other topic modeling approaches is the ability to introduce covariates other than textual variables into the whole process of topic modeling, thus directly estimating the potential impact of document metadata on topic popularity (Issock et al., 2020; Roberts et al., 2014).

STM is considered to have an advantage in mining valuable users’ insights and real-time focus from unstructured data. For example, Yang and Han (Yang and Han, 2021) utilized STM to conduct a real-time survey of user-generated content on Twitter to reveal the impact of COVID-19 on the hospitality industry, the challenges it faces, and the industry’s response. Bai et al. (2024) explored the factors affecting visitor satisfaction at theme parks and the dynamics of these factors on satisfaction using visitor-generated review data. Bai et al. (2023) explored the dynamic impact of different emotions on customer ratings using consumer reviews of on-board AI. It also explored the different emotions consumer experience perception and the dynamics of this perception based on STM.

Figure 1 shows the rationale process of modeling STM and visualizes the text analysis process. The key processes of STM can be summarized as follows.

Step 1: The prevalence of each topic of document d (denoted as θ^d) is computed based on a logistic normal generalized linear model of the document covariate vector X_d .

$$\theta_d | X_{d\gamma}, \Sigma \sim \text{LogisticNormal}(\mu = X_{d\gamma}, \Sigma)$$

where X_d is a $1 \times p$ -dimensional vector, γ is a $p \times (K-1)$ -dimensional coefficient matrix, and Σ is a $(K-1) \times (K-1)$ -dimensional covariance matrix.

Step 2: Given the document content covariate y_d , form each topic (k) represented by words on the document-specific distribution, using the baseline word distribution (m), the topic-specific bias $K_k^{(t)}$, the covariate bias $K_{y_d}^{(c)}$ and its interaction term bias $K_{y_d,k}^{(i)}$.

$$\beta_{d,k} \propto \exp\left(m + K_k^{(t)} + K_{y_d}^{(c)} + K_{y_d,k}^{(i)}\right)$$

where m and each $K_k^{(t)}$, $K_{y_d}^{(c)}$ as well as $K_{y_d,k}^{(i)}$ are length vectors, contain one input per word in the glossary, and when there are no regular covariates, β can be expressed as.

$$\beta_{d,k} \propto \exp\left(m + K_k^{(t)}\right)$$

Step 3: For each word in document d, $n \in (1, 2, \dots, N_d)$, first generate the word’s topic distribution from the document-specific topic-based distribution.

$$Z_{d,n} | \theta_d \sim \text{Multinomial}(\theta_d)$$

Then, depending on the selected theme, an observation word is taken from that topic.

$$W_{d,n} | Z_{d,n}, \beta_{d,k=z_{d,n}} \sim \text{Multinomial}(\beta_{d,k=z_{d,n}})$$

Repeat the above steps to complete the modeling process (Issock et al., 2020; Büschken and Allenby, 2016; Roberts et al., 2014).

3.2.2 Number of topics identified

In this study, ratings and review dates of organic foods were used as document-level metadata variables, and covariate analyses were conducted using the estimateEffect function from the stm package in R program. The prevalence function was set as follows:

$$\text{Prevalence} \sim \text{score} + s(\text{review dates}).$$

where s is the smoothing function of time. Next, the SearchK function in the R language stm package is used to integrate four different indicators to measure the optimal number of topics. These include Held-Out Likelihood, Semantic Coherence, Residuals, and Lower Bound. The higher the value of held-out likelihood and

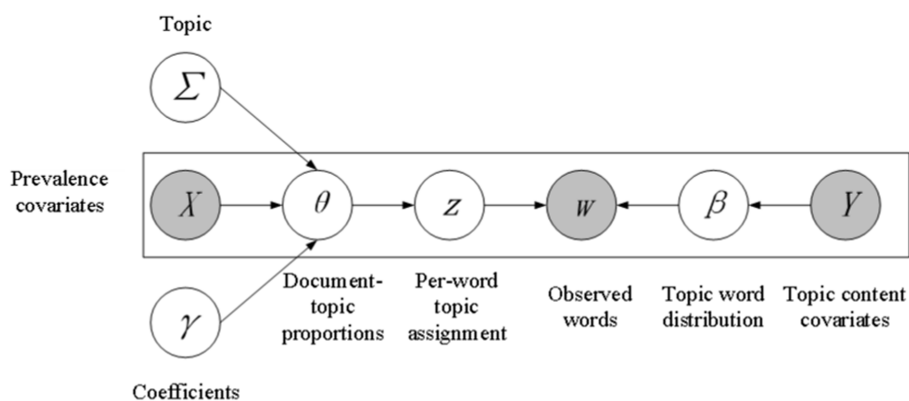


FIGURE 1 Graphical illustration of the STM approach.

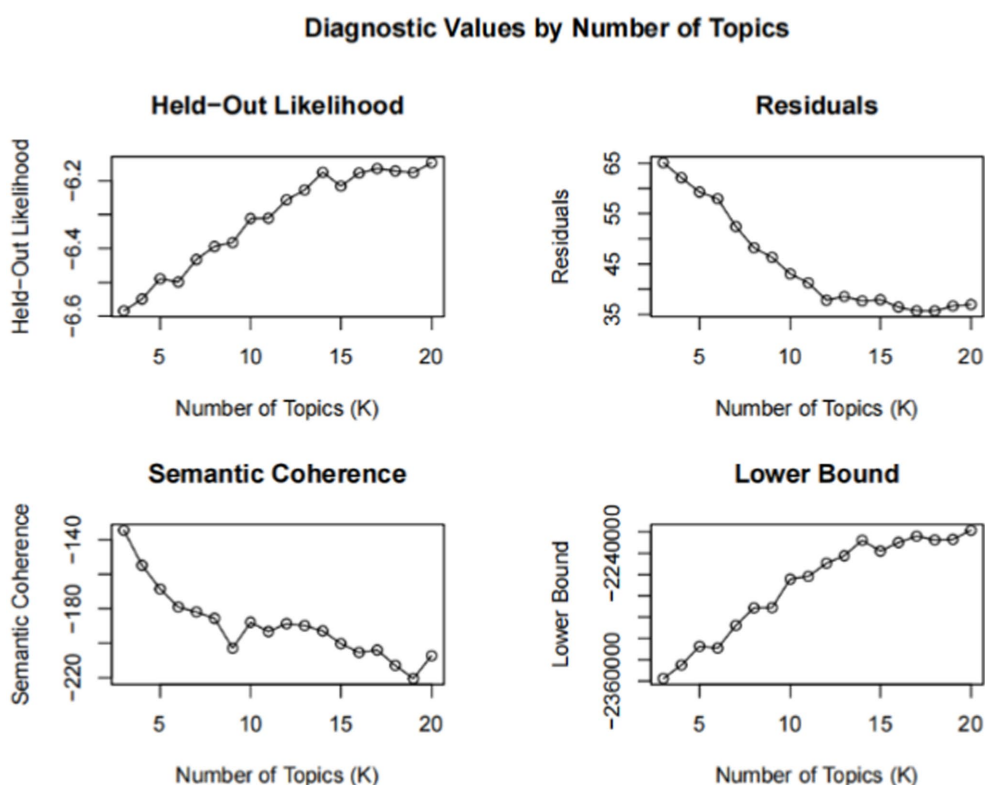


FIGURE 2 The selective topic model solution.

semantic coherence, the smaller the value of residuals and lower bound, the better the performance of the STM model (Roberts et al., 2014). According to the number of topics from 3 to 20, the changes in the four indicators are shown in Figure 2. After considering the four metrics of semantic consistency, likelihood of retention, residuals, and lower bounds, we chose a modeling scheme with 10 topics.

3.2.3 Topic labeling

We used structural topic modeling (STM) to identify 10 major topics from the 63,674 valid online consumer review data from January

1, 2019, to December 31, 2023. These themes best represent the consumer's perceived value of the organic food consumption experience and product. The program generated specific lists of keywords for each topic, identifying terms most likely to appear in a given topic and least likely in others. Three social science researchers were involved in our project to analyze these keywords provided by the STM and to define appropriate topic labels and categories. By studying the popular terms for each topic and reading the corresponding customer reviews under that topic, the research team assigned topic labels. We integrated the concepts of economic and ecological value and identified themes related

TABLE 3 Topic category and topic labeling.

Topic category	Topic label	Topic proportions (%)	Top words
Perceived economic value	Perceived discounting strength	7.99%	优惠活动(discount), 力度(strength), 活动(promotion), 超值(great value), 品质(quality), 牌子(brand), 保证(guarantee)
	Cost performance	10.10%	价格(price), 值得(worthy), 便宜(cheap), 实惠(material benefit), 性价比(Cost performance), 优惠(promotion), 划算(economical)
Perceived ecological value	Organic characteristic	7.80%	有机(organic), 放心(relieved), 认证(certification), 绿色(green), 农药(pesticide), 标志(sign), 色泽(color and luster)
	Health value	6.60%	健康(health), 营养(nutrition), 价值(value), 成分(ingredient), 维生素(vitamin), 美味(good taste), 富含(rich)
Other topics	Customer service	9.17%	质量(quality), 品牌(brand), 热情(enthusiasm), 放心(relieved), 服务(service), 服务态度(service attitude), 客服(customer service)
	Taste	8.29%	口味(taste), 含量(content), 蛋白质(protein), 脂肪(fat), 干净(clean), 规格(specification), 适用人群(appropriate crowd)
	Date	20.56%	生产日期(date of production), 保质期(expiration date), 客服(customer service), 月份(month), 失望(disappointment), 过期(expired), 坏(bad)
	Logistics service	14.20%	很快(fast), 物流(logistics), 包装(packaging), 日期(date), 快递(delivery), 运输(transportation), 破损(damaged)
	Repurchase	6.25%	回购(repurchase), 正宗(authentic), 很足(good enough), 分量(weight), 肥瘦(fat and thin), 爽口(good taste), 水份(moisture content)
	Packaging effect	9.04%	新鲜(fresh), 严实(sealed), 漏气(air leakage), 完整(whole), 破(broken), 完好无损(intact), 包裹(package)

to perceived economic value and perceived ecological value from the 10 themes of the study. Both the identification of theme labels and the identification of categories were divided several times until a consensus was reached. Finally, we identified topics related to economic value, including “Perceived discounting strength” and “Cost performance.” Topics related to ecological value included “Organic characteristic” and “Health value.” Table 3 presents these labels, their corresponding percentages, and the seven most significant words for each topic.

3.3 Variable measurement and model specification

Online customer ratings indicate overall satisfaction with the complete consumer experience (Luo et al., 2012). Referring to previous studies, this study used ratings as the quantitative value of the dependent variable (consumer satisfaction), i.e., consumer satisfaction was quantified using an overall rating of 1 to 5 for reviews (Zhuo et al., 2023). The independent variables are perceived economic value and perceived ecological value, and their quantitative values are based on the corresponding weights of each theme generated by STM with reference to the practices of previous studies (Bai et al., 2024). This study relies on the structural theme model for theme categorization and finds that consumers’ perceived economic value includes two aspects: perceived discount strength and cost performance; and perceived ecological value includes two aspects: organic character as well as health value. This study’s

independent variables consist of the weights attributed to four variables within the dimensions of perceived economic and ecological value.

In this study, time is a moderating variable, and referring to the approach in Bai’s study (Bai et al., 2024), January 1, 2019 was recorded as the reference point (denoted as 1) to explore the dynamic effects of perceived economic and ecological values on consumer satisfaction. Consumer review dates from January 1, 2019, to December 31, 2023, are transformed into a continuous scale from 1 to 1826, functioning as the moderating variable. Furthermore, to mitigate the influence of consumer preference for certain product types, product type is utilized as a control variable in our analysis.

Table 4 presents the descriptive statistics of the variables. Multicollinearity diagnostics revealed that all variance inflation factor (VIF) values were under the commonly accepted threshold (VIF = 10), signifying an absence of significant multicollinearity issues. We used multiple linear regression models to test our hypotheses. Equations 1, 2 specify our regression model, which $Topic_i^k$ denotes the weight of the k-th theme under the i-th dimension. Where $i = 1, 2$; 1 denotes perceived economic value and 2 denotes perceived ecological value. The control variables are dummy variables for product types, and the five product types were transformed into four dummy variables in this paper ($m = 1, 2, 3, 4$).

$$consumer\ satisfaction = \delta + \sum A_k * Topic_i^k + \sum B_m * controls_m + \varepsilon_i \quad (1)$$

TABLE 4 Descriptive statistics.

Category	Variable	Mean	S.D.	Min	Max
Dependent	Consumer satisfaction	3.67	1.61	1.00	5.00
Independent (Perceived economic value)	Perceived discounting strength	0.08	0.06	0.01	0.67
	Cost performance	0.10	0.07	0.01	0.70
Independent (Perceived ecologic value)	Organic characteristic	0.08	0.15	0.00	0.90
	Health value	0.07	0.09	0.00	0.88
Moderating	Time	1078.80	620.24	1.00	1826
Control	Organic fruit	0.13	0.34	0.00	1.00
	Organic milk	0.31	0.47	0.00	1.00
	Organic meat	0.17	0.37	0.00	1.00
	Organic vegetable	0.14	0.35	0.00	1.00

$$\begin{aligned}
 \text{consumer satisfaction} = & \delta + \sum A_k * \text{Topic}_i^k + B * \text{time} + \\
 & \sum C_k * \text{time} * \text{Topic}_i^k + \\
 & \sum D_m * \text{controls}_m + \varepsilon_i \quad (2)
 \end{aligned}$$

4 Results

Multiple linear regression was executed on the formulated model via SPSS, with outcomes detailed in Table 5. In addition, I performed residual diagnostics prior to hypothesis testing. According to the results of the test it was found that there is a linear relationship between the independent and dependent variables and the residuals are normally distributed. Model 1 combines control and independent variables to isolate the independent variables' direct impact on the dependent variable. Further, moderating variables and interaction terms were progressively introduced in Models 2–5, using Model 1 as the foundation. Ultimately, Model 6 amalgamated all variables for a thorough evaluation.

Model 1 showed that under the perceived economic value dimension, both consumer perceived discount strength ($b = 0.363, p < 0.001$) and cost performance ($b = 0.294, p < 0.001$) significantly increased consumer satisfaction. Under the perceived ecological value dimension, both organic characteristics ($b = 0.262, p < 0.001$) and health value ($b = 0.204, p < 0.001$) of organic food significantly increased consumer satisfaction. The results indicate that both perceived economic value and perceived ecological value significantly improved consumer satisfaction, i.e., hypotheses 1 and 2 were proved. In addition, we found that perceived economic value had a stronger positive effect on consumer satisfaction compared to perceived ecological value.

Models 2–5 show that the positive impact of perceived discount strength and cost performance on consumer satisfaction under the perceived economic value dimension is attenuated over time. In contrast, the positive effects of organic characteristics and health value on consumer satisfaction under the perceived ecological value dimension were strengthened. It shows that time weakened the positive effect of perceived economic value on consumer satisfaction and strengthened the positive effect of perceived ecological value on consumer satisfaction, i.e., Hypotheses 3 and 4 were proved.

5 Discussion and implications

5.1 Discussion

Due to the rapidly developing digital technology and changing consumer habits, online shopping behavior of consumers is becoming more and more common. E-commerce platforms not only support online organic food shopping, but also provide a convenient channel for consumer feedback. By filling out comments on e-commerce platforms, consumers share their perceptions after purchasing and using products to multiple stakeholders, such as sellers, potential buyers, and platform administrators, to realize the interaction of product information or service information. The information is real information from consumers' consumption experience. This form allows consumers to participate in the value creation of organic food. This paper provides an in-depth analysis of consumer-perceived value from consumers' online reviews of organic food products and evaluates how perceived economic and ecological value affects customer satisfaction. The results of this study respond to the three research questions posed in the introduction. Specifically, they include the following three areas.

First, both the perceived economic value and the perceived ecological value of organic food promote consumer satisfaction. This contrasts sharply with prior research, which indicates that ecological characteristics are frequently de-emphasized when consumers evaluate different product attributes broadly (Schuitema and de, 2015). Supporting this observation, Cai et al. (2017) report that most consumers prioritize brand and price over ecological attributes when purchasing furniture, revealing a significant undervaluation of ecological features in consumer decision-making processes. This study argues that consumers are also stakeholders of nature and their consumption is balanced with the environment in which they live. Consumers' ecological awareness determines their expectations and demand for green products (Qi and Ploeger, 2021). Moreover, consumers' perceptions of ecological well-being affect their overall evaluation of product functionality and influence consumers' emotional fulfillment and sensory experience (Qi and Ploeger, 2021). Thus, the ecological value perceived in organic foods can shape consumers' overall assessment, with higher satisfaction stemming from the recognition of ecological advantages in their purchases.

TABLE 5 Multiple linear regression results.

DV=Consumer satisfaction	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Direct effects						
Perceived discounting strength	0.363***	0.461***	0.424***	0.415***	0.407***	0.429***
Cost performance	0.294***	0.289***	0.314***	0.294***	0.288***	0.235***
Organic characteristic	0.262***	0.225***	0.224***	0.014*	0.236***	0.078***
Health value	0.204***	0.220***	0.219***	0.237***	0.044***	0.066***
Moderating effects						
Time		0.309***	0.300***	0.207***	0.149***	0.269***
Perceived discounting strength*time		-0.050***				-0.036***
Cost performance*time			-0.037***			0.082***
Organic characteristic*time				0.250***		0.189***
Health value*time					0.260***	0.246***
Control variables						
Organic fruit	0.107***	0.097***	0.098***	0.102***	0.108**	0.111***
Organic milk	-0.020***	-0.025***	-0.023***	-0.020***	-0.040***	-0.038***
Organic meat	0.081***	0.041***	0.041***	0.048***	0.055***	0.060***
Organic vegetable	0.174***	0.139***	0.139***	0.142***	0.144***	0.146***
R ²	0.443	0.513	0.513	0.522	0.536	0.541
R ² _a	0.443	0.513	0.513	0.522	0.536	0.541

***p < 0.001, **p < 0.01, and *p < 0.05.

Second, we find that perceived economic value is more important in positively influencing consumer satisfaction than perceived ecological value. The outcomes demonstrate how consumer choices reveal preferences and the trade-offs they make among various attributes (Luchs and Kumar, 2017). Prior research frequently identifies price as a crucial determinant in shaping decisions related to green consumption (Jo and Shin, 2017). Customers generally pursue products that are affordable or provide strong value for their money. Additionally, Huang et al. (2022) underscored the significance of addressing negative public perceptions regarding the pricing of green products, presenting compelling evidence to support this perspective. Consumers show higher satisfaction when they perceive that the value of organic food that they buy is equal to or even exceeds the cost, i.e., they perceive that the economic value of organic food is higher than expected expectations.

Third, this study introduces time as a moderating variable and finds that the positive effect of perceived ecological value on consumer satisfaction increases over time, while the positive effect of perceived economic value on consumer satisfaction decreases. Current consumer philosophy and lifestyles are gradually moving in a more positive, healthy and environmentally friendly direction (Li et al., 2023). The eco-benefits of green products, such as energy saving, environmental protection, resource conservation, health benefits, etc., are usually long-term and gradual processes, and often take some time to fully realize (Li et al., 2023). A study in 2015 proved that ecological attributes are often overlooked when consumers weigh different product attributes across the board (Schuitema and de, 2015). However this result was overturned in a 2022 study, demonstrating that consumer concern and positive sentiment toward eco-properties has increased significantly over the last 3 years (Li et al., 2023).

Therefore, this study concludes that consumer awareness and concern about the ecological value of organic food is deepening. Consumers are increasingly likely to have positive attitudes toward organic food for its ecological value. This paper suggests four reasons for the observed phenomenon. Firstly, the ecological value brought by organic food has been effectively demonstrated over time, leading to an overall greater focus on ecological values by consumers. Secondly, the proactive role of the Chinese government in fostering a green consumption culture. Through the implementation of various intervention and guidance policies aimed at promoting eco-friendly consumer behavior, positive strides have been made toward enhancing the awareness and acceptance of green consumption practices within the country (Li et al., 2023). Under the guidance of the policies, consumers' concern for their own health and living environment has been significantly enhanced, and they will consider the ecological value of organic food before purchasing and have higher expectations of the health and environmental benefits generated by the products, and the high performance of the final products in these aspects will increase consumer satisfaction. Third, the Covid-19 pandemic has led to concerns about health and the natural environment being on the rise (Li et al., 2024), and sales of organic products have increased significantly (Roh et al., 2022). In addition, studies have shown that consumers often need to make certain compromises on other attributes (e.g., price) in order to obtain the ecological characteristics of green products (Newman et al., 2014). Positive consumer sentiment toward the ecological attributes of green products is gradually increasing in the long-term consumption process (Wang et al., 2024). Consumers are willing to pay a premium for the ecological attributes of green products, which they consider to be a reasonable reflection of their investment in health, safety and environmental protection

(Chen et al., 2024). Therefore, this study concluded that organic food as a green product, that is, consumers gradually recognize the ecological value of organic food in the long-term consumption process, and regard higher prices as a reasonable investment in the environment and health, will reduce the importance of economic factors such as the price of organic food in consumer decision-making. In addition, the size of the organic food industry has continued to grow over the years as technology proliferates and health and environmental issues become more prominent (Anisimova and Vrontis, 2024). The development of technology and the continued increase in the size of the organic food industry will lead to the realization of the scale effect, which will further reduce the production costs of organic food, and the price gap between organic and conventional food will be further narrowed (Smoluk-Sikorska et al., 2024). In conclusion, this study argues that, on the one hand, consumers are becoming more concerned about ecological value over time, which will lead to a decrease in the contribution of perceived economic value to consumer satisfaction. On the other hand, the price gap between organic and conventional foods is narrowing over time, which will also lead to a decrease in consumer attention to the economic value of organic foods.

5.2 Theoretical implications

Our research makes several theoretical contributions. First, this study enriches the measurement of perceived value in the field of sustainable consumption by mining the perceived economic value and perceived ecological value of consumers' perceived value of organic food from online reviews based on consumer value theory. However, in the field of sustainable consumption, consumer perceived value is mostly investigated through questionnaires and interviews (Department of Business Administration, 2019; Lin and Huang, 2012; Sheth et al., 1991; Roh et al., 2022; Watanabe et al., 2020). There are relatively few studies that capture consumer perceived value from user reviews. Therefore, this study utilizes structural topic modeling to obtain consumer perceived value from reviews, and with the framework of consumer value theory, it elaborates on the specific dimensions of perceived economic value and perceived ecological value of consumers' attention to organic food. Specifically, this study found that consumers' perceived economic value of organic food includes perceived discount strength and cost-effectiveness, and perceived ecological value of organic food includes organic characteristics and health value. Our study broadens the application of consumer value theory to some extent and deepens its interpretation in the field of sustainable consumption.

Second, this study enriches the previous literature by revealing the facilitating role of perceived economic value and perceived ecological value on satisfaction with organic food based on expectation disconfirmation theory. In the existing literature on organic food, the facilitating role between perceived economic value and perceived ecological value on consumers' purchase intention and purchase behavior was found (Department of Business Administration, 2019; Roh et al., 2022; Watanabe et al., 2020). However, relatively few studies have been conducted on the role of these two values on satisfaction with organic food. This study reveals, from the perspective of expectation disconfirmation theory, that both perceived economic value and perceived ecological value of organic food exceed consumers' expectations, which contribute to consumers' satisfaction with organic food. Moreover, perceived economic value increases

consumer satisfaction more than perceived ecological value. This finding enriches the scope of application of expectation disconfirmation theory in the field of organic food.

At the end and most importantly, this study adds the time factor as a moderator, which extends the dynamic perspective to the study of perceived value of organic food and further enriches the existing research. Most of the current research on studying the impact of perceived value on consumers has been conducted from a static perspective (Department of Business Administration, 2019; Lin and Huang, 2012; Sheth et al., 1991; Roh et al., 2022; Watanabe et al., 2020). Recent studies have emphasized the importance of capturing dynamic changes in consumer preferences for product improvement and marketing strategies (Li et al., 2023). This study adds the time factor as a moderator and demonstrates that the positive impact of perceived economic value on consumer satisfaction is being attenuated over time, while the positive impact of perceived ecological value on consumer satisfaction is being enhanced. This finding not only reveals the dynamic changes in consumer values and preferences, but also emphasizes that the ecological value of organic food has gradually become a more important factor for consumers as society's awareness of sustainable development and environmental protection increases. The introduction of this dynamic perspective further enriches the theoretical research on perceived value in the field of sustainable consumption.

5.3 Managerial implication

This study meticulously analyzes consumer feedback on online platforms for organic food products, revealing consumers' perceptions of the economic and ecological values of the products and deepening the understanding of how these values dynamically affect consumer satisfaction. The findings provide valuable insights for policymakers, organic food producers, and e-commerce platforms to improve their strategic decisions, operational management, and business practices, which are expected to drive food purchasing behaviors in the field of sustainable consumption.

For policy makers, this study not only emphasizes consumers' dual concern for the economic and ecological values of organic food, but also reveals the dynamic effects of both over time. This helps policy makers to formulate more precise and effective policies. For example, considering that the short-term impact of perceived economic value on consumer satisfaction is more significant, the government can adopt short-term incentives, such as tax reduction and subsidies, to reduce consumer purchasing costs and improve the market competitiveness of products. Meanwhile, in response to the trend of long-term growth in perceived ecological value, the government should continue to strengthen environmental education and public campaigns to raise public awareness of ecological and environmental protection and guide consumers to form greener and healthier consumption habits. In addition, the government needs to strengthen market regulation and set and enforce strict standards to ensure that organic food on the market truly meets consumer expectations and ecological requirements.

For organic food producers, this study emphasizes the dual concern of consumers for the economic and ecological value of organic food and its dynamic changes. Producers need to pay close attention to the diversification of consumer demand and optimize the planting, breeding and processing processes to control costs while

ensuring that the ecological value of organic food continues to increase. At the same time, producers also need to be sensitive to spatial and temporal changes in consumer evaluation of products, and adjust their R&D priorities and marketing strategies in a timely manner to cope with market changes. For example, as consumers pay more attention to the ecological value, producers can pay more attention to the embodiment of ecological characteristics in the production process of organic food, and deepen consumers' recognition of the ecological value of organic food through environmentally friendly packaging and green logistics, so as to improve overall consumer satisfaction.

For e-commerce platforms, this study highlights the growing consumer interest in ecological values and therefore the need to disclose information related to the ecological values of organic food. Drawing on signaling theory, online product information serves as a cue for consumers' expectations of product and service features (Connelly et al., 2011). Before making a purchase, these cues impact consumers' expectations about vendors and products, especially when purchasing online (On Product Uncertainty in Online Markets, 2012). E-commerce platforms play an important role in enabling consumers to identify authentic organic food items and increasing sales by presenting information about the ecological advantages of these products, such as health and environmental benefits, as well as displaying organic certification symbols.

6 Limitations and future research

Although our study gained some interesting and valuable insights, it is not without limitations. First, although we chose high-traffic e-commerce platforms and five representative organic food products for our study, they still do not cover the entire organic food consumption market. Second, this study was conducted only in China and could not capture consumer perceptions in multiple cultural contexts. In future studies, we will consider product types, different e-commerce platforms, online and offline multi-channels, and consumer behaviors in multiple cultural contexts to explore. In addition, the dynamic effects of the time variables were assumed to be linear, which may have overlooked potential nonlinear or phased effects. And there is a degree of subjectivity involved in the definition of topic labels. In future studies, we will try to find more social researcher involvement and more advanced computerized methods to reduce subjectivity. Then, this study mainly focuses on the exploration of perceived economic value and perceived ecological value, and the exploration of social, functional, and emotional value is insufficient, and future research will continue to expand related studies. Finally, because the data are anonymized, these findings from this study primarily reflect average trends at the group level and lack insight into the trajectory of individual behavior over time. We will continue to learn new methods of data analysis or the

integration of big data analytics with questionnaires to further explore insights into the trajectory of individual differences in consumers over time.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

HH: Conceptualization, Funding acquisition, Project administration, Writing – review & editing. JY: Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Visualization, Writing – original draft. QL: Data curation, Formal analysis, Methodology, Validation, Visualization, Software, Writing – review & editing. RW: Supervision, Validation, Writing – review & editing. CW: Data curation, Methodology, Software, Validation, Writing – review & editing. DY: Methodology, Validation, Visualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

- Anisimova, T., and Vrontis, D. (2024). The food you can trust: the moderating role of age in the relationship between consumer values and organic food trust. *J. Bus. Res.* 182:114803. doi: 10.1016/J.JBUSRES.2024.114803
- Bai, S., He, H., Han, C., Yang, M., Yu, D., Bi, X., et al. (2024). Exploring thematic influences on theme park visitors' satisfaction: an empirical study on Disneyland China. *J. Consum. Behav.* 23, 90–106. doi: 10.1002/cb.2157
- Bai, S., Yu, D., Han, C., Yang, M., Islam, N., Yang, Z., et al. (2023). Enablers or inhibitors? Unpacking the emotional power behind in-vehicle AI anthropomorphic interaction: a dual-factor approach by text mining. *IEEE Trans. Eng. Manag.* 71, 13149–13165. doi: 10.1109/TEM.2023.3327500
- Berezina, B., Bilgihan, A., Cobanoglu, C., and Okumus, F. (2016). Understanding satisfied and dissatisfied hotel customers: text Mining of Online Hotel Reviews. *J. Hosp. Mark. Manag.* 25, 1–24. doi: 10.1080/19368623.2015.983631
- Bhattacharyya, J., Balaji, M. S., and Jiang, Y. (2023). Causal complexity of sustainable consumption: unveiling the equifinal causes of purchase intentions of plant-based meat alternatives. *J. Bus. Res.* 156:113511. doi: 10.1016/J.JBUSRES.2022.113511

- Bosona, T., and Gebresenbet, G. (2018). Swedish Consumers' perception of food quality and sustainability in relation to organic food production. *Foods (Basel, Switzerland)* 7:54. doi: 10.3390/foods7040054
- Boulding, W., Kalra, A., Staelin, R., and Zeithaml, V. A. (1993). A dynamic process model of service quality: from expectations to behavioral intentions. *J. Mark. Res.* 30, 7–27. doi: 10.1177/002224379303000102
- Büschken, J., and Allenby, G. M. (2016). Sentence-based text analysis for customer reviews. *Mark. Sci.* 35, 953–975. doi: 10.1287/mksc.2016.0993
- Cai, Z., Xie, Y., and Aguilar, F. X. (2017). Eco-label credibility and retailer effects on green product purchasing intentions. *Forest Policy Econ.* 80, 200–208. doi: 10.1016/j.forpol.2017.04.001
- Chaihanchanchai, P., and Anantachart, S. (2023). Encouraging green product purchase: green value and environmental knowledge as moderators of attitude and behavior relationship. *Bus. Strateg. Environ.* 32, 289–303. doi: 10.1002/BSE.3130
- Chen, Y.-S. (2010). The drivers of green brand equity: green brand image, green satisfaction, and green trust. *J. Bus. Ethics* 93, 307–319. doi: 10.1007/s10551-009-0223-9
- Chen, C., Zhang, D., Zhu, L., and Zhang, F. (2024). Promoting green choices: how price premium displays influence consumer preference for green products. *Resour. Conserv. Recycl.* 207:107682. doi: 10.1016/j.resconrec.2024.107682
- China Agricultural University (2018). Consumers' perceptions, purchase intention, and willingness to pay a premium price for safe vegetables: a case study of Beijing, China. *J. Clean. Prod.* 197, 1498–1507. doi: 10.1016/j.jclepro.2018.06.273
- Connelly, B. L., Certo, S., Ireland, R., and Reutzel, C. (2011). Signaling theory: a review and assessment. *J. Manag.* 37, 39–67. doi: 10.1177/0149206310388419
- Danner, H., and Menapace, L. (2020). Using online comments to explore consumer beliefs regarding organic food in German-speaking countries and the United States. *Food Qual. Prefer.* 83:103912. doi: 10.1016/j.foodqual.2020.103912
- Department of Business Administration (2019). The influence of perceived food quality, price fairness, perceived value and satisfaction on customers' revisit and word-of-mouth intentions towards organic food restaurants. *J. Retail. Consum. Serv.* 50, 103–110. doi: 10.1016/j.jretconser.2019.05.005
- Fiske, S. T., Cuddy, A. J., and Glick, P. (2007). Universal dimensions of social cognition: warmth and competence. *Trends Cogn. Sci.* 11, 77–83. doi: 10.1016/j.tics.2006.11.005
- Ghazali, E., Soon, P. C., Mutum, D. S., and Nguyen, B. (2017). Health and cosmetics: investigating consumers' values for buying organic personal care products. *J. Retail. Consum. Serv.* 39, 154–163. doi: 10.1016/j.jretconser.2017.08.002
- Hemmerling, S., Hamm, U., and Spiller, A. (2015). Consumption behaviour regarding organic food from a marketing perspective—a literature review. *Org. Agric.* 5, 277–313. doi: 10.1007/s13165-015-0109-3
- Higgs, B., Polonsky, M. J., and Hollick, M. (2005). Measuring expectations: forecast vs. ideal expectations. Does it really matter? *J. Retail. Consum. Serv.* 12, 49–64. doi: 10.1016/j.jretconser.2004.02.002
- Holbrook, M. B. (1994) Chap. 2. The Nature of Customer Value: An Axiology of Services in the Consumption Experience. In: *Service quality: new directions in theory and practice*. (eds.) R. T. Rust and R. L. Oliver (Thousand Oaks: Sage), 21–71.
- Huang, H., Long, R., Chen, H., Li, Q., Wu, M., and Gan, X. (2022). Knowledge domain and research progress in green consumption: a phase upgrade study. *Environ. Sci. Pollut. Res. Int.* 29, 38797–38824. doi: 10.1007/S11356-022-19200-3
- Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., and Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *J. Consum. Behav.* 6, 94–110. doi: 10.1002/cb.210
- Issock, P., Mpinganjira, M., and Roberts-Lombard, M. (2020). Modelling green customer loyalty and positive word of mouth. *Int. J. Emerg. Mark.* 15, 405–426. doi: 10.1108/IJOEM-09-2018-0489
- Jan, I., Ji, S., and Yeo, C. (2019). Values and green product purchase behavior: the moderating effects of the role of government and media exposure. *Sustain. For.* 11:6642. doi: 10.3390/su11236642
- Jiang, L., Zhou, W., Ren, Z., and Yang, Z. (2022). Make the apps stand out: discoverability and perceived value are vital for adoption. *J. Res. Interact. Mark.* 16, 494–513. doi: 10.1108/JRIM-03-2021-0076
- Jo, M., and Shin, J. (2017). Market strategy for promoting green consumption: consumer preference and policy implications for laundry detergent. *Int. J. Consum. Stud.* 41, 283–290. doi: 10.1111/ijcs.12339
- Kautish, P., Paul, J., and Sharma, R. (2019). The moderating influence of environmental consciousness and recycling intentions on green purchase behavior. *J. Clean. Prod.* 228, 1425–1436. doi: 10.1016/j.jclepro.2019.04.389
- Koller, M., Floh, A., and Zauner, A. (2011). Further insights into perceived value and consumer loyalty: a "green" perspective. *Psychol. Mark.* 28, 1154–1176. doi: 10.1002/mar.20432
- Lakatos, E. S., Nan, L. M., Bacali, L., Ciobanu, G., Ciobanu, A. M., and Cioca, L. I. (2021). Consumer satisfaction towards green products: empirical insights from Romania. *Sustain. For.* 13:10982. doi: 10.3390/SU131910982
- Laudien, S., Manuel, J., and Maria, J. (2023). Business models based on sharing fashion and accessories: qualitative-empirical insights into a new type of sharing economy business models. *J. Bus. Res.* 157:113636. doi: 10.1016/J.JBUSRES.2022.113636
- Li, H., Cao, A., Chen, S., and Guo, L. (2024). How does risk perception of the COVID-19 pandemic affect the consumption behavior of green food? *Environ. Dev. Sustain.* 26, 2307–2329. doi: 10.1007/S10668-022-02819-0
- Li, C., Niu, Y., and Wang, L. (2023). How to win the green market? Exploring the satisfaction and sentiment of Chinese consumers based on text mining. *Comput. Hum. Behav.* 148:107890. doi: 10.1016/J.CHB.2023.107890
- Liao, J., Chen, K., Qi, J., Li, J., and Yu, I. Y. (2023). Creating immersive and parasocial live shopping experience for viewers: the role of streamers' interactional communication style. *J. Res. Interact. Mark.* 17, 140–155. doi: 10.1108/JRIM-04-2021-0114
- Lin, P.-C., and Huang, Y.-H. (2012). The influence factors on choice behavior regarding green products based on the theory of consumption values. *J. Clean. Prod.* 22, 11–18. doi: 10.1016/j.jclepro.2011.10.002
- Lindsey, L., and Gillson, L. (2001). Book review: Blackwell's concise encyclopedia of ecology. *The Holocene* 11:377. doi: 10.1177/095968360101100315
- Luchs, M. G., and Kumar, M. (2017). "Yes, but this other one looks better/works better": how do consumers respond to trade-offs between sustainability and other valued attributes? *J. Bus. Ethics* 140, 567–584. doi: 10.1007/s10551-015-2695-0
- Luo, J., Ba, S., and Zhang, H. (2012). The effectiveness of online shopping characteristics and well-designed websites on satisfaction. *MIS Q.* 36:1131. doi: 10.2307/41703501
- Luo, B., Li, L., and Sun, Y. (2022). Understanding the influence of consumers' perceived value on energy-saving products purchase intention. *Front. Psychol.* 12:640376. doi: 10.3389/FPSYG.2021.640376
- Ma, S., Hua, Y., Li, D., and Wang, Y. (2022). Proposing customers economic value or relational value? A study of two stages of the crowdfunding project. *Decis. Sci.* 53, 712–749. doi: 10.1111/DECI.12502
- Magnusson, M. K., Arvola, A., Hursti, U.-K. K., Åberg, L., and Sjöden, P.-O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite* 40, 109–117. doi: 10.1016/S0195-6663(03)00002-3
- Moliner, M. A., and Tortosa-Edo, V. (2024). Multirooming: generating e-satisfaction throughout omnichannel consumer journey design and online customer experience. *JRIM* 18, 349–369. doi: 10.1108/JRIM-05-2023-0149
- Nangpiire, C., Silva, J., and Alves, H. (2022). Customer engagement and value co-creation/destruction: the internal fostering and hindering factors and actors in the tourist/hotel experience. *J. Res. Interact. Mark.* 16, 173–188. doi: 10.1108/JRIM-05-2020-0104
- Newman, G., Gorlin, M., and Dhar, R. (2014). When going green backfires: how firm intentions shape the evaluation of socially beneficial product enhancements. *J. Consum. Res.* 41, 823–839. doi: 10.1086/677841
- Notarnicola, B., Hayashi, K., Curran, M. A., and Huisingh, D. (2012). Progress in working towards a more sustainable Agri-food industry. *J. Clean. Prod.* 28, 1–8. doi: 10.1016/j.jclepro.2012.02.007
- Oliver, R. L., Rust, R. T., and Varki, S. (1997). Customer delight: foundations, findings, and managerial insight. *J. Retail.* 73, 311–336. doi: 10.1016/S0022-4359(97)90021-X
- On Product Uncertainty in Online Markets (2012). Theory and evidence. *MIS Q.* 36, 395–426. doi: 10.2307/41703461
- Peattie, K. (2010). Green consumption: behavior and norms. *Annu. Rev. Environ. Resour.* 35, 195–228. doi: 10.1146/annurev-environ-032609-094328
- Qi, X., and Ploeger, A. (2021). An integrated framework to explain consumers' purchase intentions toward green food in the Chinese context. *Food Qual. Prefer.* 92:104229. doi: 10.1016/J.FOODQUAL.2021.104229
- Rathore, A. K., and Ilavarasan, P. V. (2020). Pre- and post-launch emotions in new product development: insights from twitter analytics of three products. *Int. J. Inf. Manag.* 50, 111–127. doi: 10.1016/j.ijinfomgt.2019.05.015
- Roberts, M. E., Stewart, B. M., Tingley, D., Lucas, C., Leder-Luis, J., Gadarian, S. K., et al. (2014). Structural topic models for open-ended survey responses. *Am. J. Polit. Sci.* 58, 1064–1082. doi: 10.1111/ajps.12103
- Roh, T., Seok, J., and Kim, Y. (2022). Unveiling ways to reach organic purchase: green perceived value, perceived knowledge, attitude, subjective norm, and trust. *J. Retail. Consum. Serv.* 67:102988. doi: 10.1016/J.JRETCONSER.2022.102988
- Román-Augusto, J., Garrido-Lecca-Vera, C., Lodeiros-Zubiria, M., and Mauricio-Andia, M. (2022). Green marketing: drivers in the process of buying green products—the role of green satisfaction, green trust, green WOM and green perceived value. *Sustain. For.* 14:10580. doi: 10.3390/SU141710580
- Sadiq, M., Paul, J., and Bharti, K. (2020). Dispositional traits and organic food consumption. *J. Clean. Prod.* 266:121961. doi: 10.1016/j.jclepro.2020.121961
- Sangroya, D., and Nayak, J. K. (2017). Factors influencing buying behaviour of green energy consumer. *J. Clean. Prod.* 151, 393–405. doi: 10.1016/j.jclepro.2017.03.010
- Schuitema, G., and de, J. (2015). Green consumerism: the influence of product attributes and values on purchasing intentions. *J. Consum. Behav.* 14, 57–69. doi: 10.1002/cb.1501

- Sheth, J. N., Newman, B. I., and Gross, B. L. (1991). Why we buy what we buy: a theory of consumption values. *J. Bus. Res.* 22, 159–170. doi: 10.1016/0148-2963(91)90050-8
- Siebeneicher, S., and Bock, C. (2022). Sustainable aim and personal gain? How sustainable value affects the relation between personal value and crowdfunding success. *Technol. Forecast. Social Change* 183:121938. doi: 10.1016/J.TECHFORE.2022.121938
- Smoluk-Sikorska, J., Śmiglak-Krajewska, M., Rojik, S., and Fulnecková, P. R. (2024). Prices of organic food—the gap between willingness to pay and Price premiums in the organic food market in Poland. *Agriculture* 14:17. doi: 10.3390/AGRICULTURE14010017
- Steg, L., Perlaviciute, G., van, E., and Lurvink, J. (2014). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environ. Behav.* 46, 163–192. doi: 10.1177/0013916512454730
- Tian, H., Siddik, A., and Masukujaman, M. (2022). Factors affecting the repurchase intention of organic tea among millennial consumers: an empirical study. *Behav. Sci.* 12:50. doi: 10.3390/BS12020050
- Upadhyay, N., and Kamble, A. (2023). Examining Indian consumer pro-environment purchase intention of electric vehicles: perspective of stimulus-organism-response. *Technol. Forecast. Social Change* 189:122344. doi: 10.1016/J.TECHFORE.2023.122344
- Wang, C. (2024). Editorial – what is an interactive marketing perspective and what are emerging research areas? *J. Res. Interact. Mark.* 18, 161–165. doi: 10.1108/JRIM-03-2024-371
- Wang, L., Chen, L., and Li, C. (2024). Research on strategies for improving green product consumption sentiment from the perspective of big data. *J. Retail. Consum. Serv.* 79:103802. doi: 10.1016/j.jretconser.2024.103802
- Watanabe, E., Alfinito, S., Curvelo, I., and Hamza, K. (2020). Perceived value, trust and purchase intention of organic food: a study with Brazilian consumers. *Br. Food J.* 122, 1070–1184. doi: 10.1108/bfj-05-2019-0363
- Woo, E., and Kim, Y. G. (2019). Consumer attitudes and buying behavior for green food products. *Br. Food J.* 121, 320–332. doi: 10.1108/BFJ-01-2018-0027
- Xie, B., Wang, L., Yang, H., Wang, Y., and Zhang, M. (2015). Consumer perceptions and attitudes of organic food products in eastern China. *Br. Food J.* 117, 1105–1121. doi: 10.1108/BFJ-09-2013-0255
- Yang, M., and Han, C. (2021). Revealing industry challenge and business response to Covid-19: a text mining approach. *Int. J. Contemp. Hosp. Manag.* 33, 1230–1248. doi: 10.1108/IJCHM-08-2020-0920
- Yin, S., Chen, M., Chen, Y., Xu, Y., Zou, Z., and Wang, Y. (2016). Consumer trust in organic milk of different brands: the role of Chinese organic label. *Br. Food J.* 118, 1769–1782. doi: 10.1108/BFJ-11-2015-0449
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *J. Mark.* 52, 2–22. doi: 10.1177/002224298805200302
- Zhang, J., Zhang, L., and Ma, B. (2023). Ride-sharing platforms: the effects of online social interactions on loyalty, mediated by perceived benefits. *J. Res. Interact. Mark.* 17, 698–713. doi: 10.1108/JRIM-01-2022-0012
- Zhao, Y., Xu, X., and Wang, M. (2019). Predicting overall customer satisfaction: big data evidence from hotel online textual reviews. *Int. J. Hosp. Manag.* 76, 111–121. doi: 10.1016/j.ijhm.2018.03.017
- Zhuo, L., Xuefeng, Z., and Grace, O. (2023). Understanding customer satisfaction in curated subscription services: moderating roles of subscription time and information disclosure. *Inf. Manag.* 60:103834. doi: 10.1016/J.IM.2023.103834