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How Does Ant Forest Influence Low Carbon Consumption Behavior: An Analysis Based on the S-O-R Model

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Abstract: As environmental problems continue to worsen, new ways need to be found to stimulate people to be proactive in protecting the environment and engage in low-carbon behaviors. The use of eco-friendly apps may become a powerful tool for promoting offline environmental activities and encouraging low-carbon consumption behavior. Using survey data from 298 Ant Forest app users and based on the theory of consumption value, this study applies the S-O-R model and uses structural equation modeling (SEM) to explore the impact of Ant Forest usage on consumers' low-carbon behavior. Our research shows that Ant Forest usage enhances users' low carbon purchase behavior and habitual low carbon consumption behavior. Epistemic, emotional, and social values play mediating roles in the usage and low-carbon consumption behaviors of Ant Forest users. When users feel the epistemic, emotional, and social values of using Ant Forest, they are more willing to engage in low-carbon consumption behavior. Herd mentality serves as a moderating variable that amplifies Ant Forest users' sense of experience, enabling them to derive more epistemic and social value from using Ant Forest. Ant Forest's online games and offline environmental activities help users develop low-carbon consumption habits, and this is worth promoting and replicating.

Keywords: S-O-R theoretical model; low carbon consumption behavior; consumption value theory; Ant Forest usage behavior; environmental concern

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1. Introduction

Our planet's environment has been deteriorating noticeably and today our world faces daunting environmental challenges. According to the Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change (IPCC), Earth's surface temperature will rise by an average of 0.3 °C to 4.8 °C by the end of this century [1]. Researchers agree that environmental change is closely related to human activities [2,3], and one of the main causes of environmental degradation is massive emissions of greenhouse gases by human beings [4]. Encouraging sustainable lifestyle behaviors is one strategy aimed at addressing this issue [5], and many voices are now calling for consumers to adopt low-carbon consumption behavior in their daily lives as a way of mitigating their negative impact on the environment [6].

A great deal of academic research has focused on low-carbon behaviors [7,8], including low-carbon travel behavior [9], low-carbon business practices [10], low-carbon consumption behavior [11], and so on. Among these, low-carbon consumption behavior has the largest and most direct impact on the environment [12]. Low-carbon consumption behavior, characterized by energy conservation and emission reduction, has attracted the attention of scholars and governments around the world, and many researchers have affirmed the positive role of the Low-Carbon City Pilot in influencing individual behavior to a certain extent [13]. However, although more and more people have begun to realize the importance of low-carbon consumption, only a small number of consumers actually engage

in low-carbon consumption [14]. Consumption activities have been relatively unaffected by government intervention [15], and because low-carbon products tend to be more expensive than traditional products, consumers rarely buy them.

While external incentives (e.g., slogans and advertisements) may stimulate consumers' willingness to engage in green consumption, they seldom produce behavioral change [16]. New ideas are given by Chen et al.'s (2020) study, which argues that environmental conservation activities based on digital technologies can foster green consumption users and may be a key tool in combating global climate change [17]. Several e-commerce platforms that promote green consumption through gamification have emerged, the most representative of which in China is Alipay's Ant Forest. Users of this app earn "energy" through low-carbon consumption, such as paperless payment, green travel, and non-cutlery takeout. When a user reaches a certain level, the platform will plant a real tree and issue a certificate, thus motivating users to participate long-term and engage in green consumption behavior that ultimately produces tangible environmental effects. We combed the literature on Ant Forest affecting consumer behavior. Extant research on the impact of Ant Forest has mainly focused on users' usage motivations and usage behavior [17,18]. How Ant Forest users' usage behavior actually affects their low-carbon consumption practices from the perspective of consumption value remains unexplored. In order to address this research gap, we applied the consumption value theory based on an S-O-R model to determine if and how Ant Forest users' usage behavior correlated with their low-carbon consumption behavior.

In this study, an S-O-R theoretical model was established using Ant Forest users' usage behavior as the stimulus (independent variable), consumption value as the organism (intermediate variable), and low-carbon consumption behavior as the response (outcome variable). We collected the views of Ant Forest users through a questionnaire survey, analyzed how their Ant Forest usage affected their daily low-carbon consumption behavior, and examined whether the process changed when affected by others' behavior (herd psychology). A total of 298 valid survey questionnaires were obtained and a structural equation model was used to analyze the data.

This study focuses on addressing the gap of how Ant Forest users' usage behavior affects low-carbon consumption behavior. And this study extends the current literature on green consumption, the Ant Forest app and other pro-environmental platforms, and consumption value, providing new perspectives on the promotion of low-carbon consumption. At the same time, these insights about the Ant Forest action mechanism offer valuable direction for other online public welfare environmental protection projects.

2. Theoretical Background and Hypothetical Development

2.1. Stimulus-Organism-Response Model

The stimulus-organism-response (S-O-R) model was initially put forward by Mehrabian & Russell (1974) [19] and was applied in the field of environmental psychology. It is used to examine the process of external environmental stimulation on individual consumption behavior. "Stimulus" refers to external factors that affect individual cognition. "Organism" refers to an internal process that intervenes between a stimulus and a response. "Reactions" are often conceptualized as individual approaches or avoidance behaviors. The model suggests that various aspects of the environment, such as perceptual, physiological, sensory, and mental activities, affect people's internal state and organic experience. This internal state in turn drives their behavioral responses [19]. Scholars often use the S-O-R model to study consumer behavior. Islam (2020) found that peer-to-peer surveillance influenced satisfaction with group work through mediators such as perceived surveillance (cognition) and stress (affect) [20]. Kim (2019) probed structural relationships among sport service environments, excitement, consumer-to-consumer interaction, and consumer citizenship behaviors based on the S-O-R model [21].

The S-O-R model has wide applicability, and studies have shown that S-O-R theory can reasonably explain the mechanism of external stimulus on consumer behavior. This study offers a theoretical model with Ant Forest usage behavior as S, consumption value as

O, and low-carbon consumption behavior as R, and investigated the moderating effect of herd mentality. Figure 1 depicts our theoretical model.

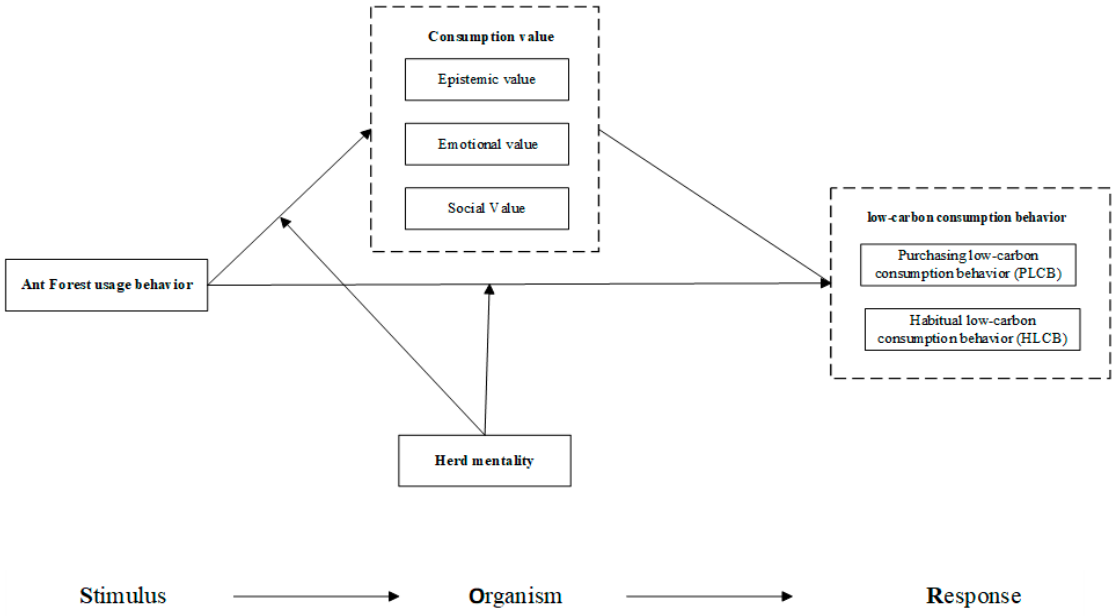

Figure 1. Theoretical model.

2.2. Ant Forest Usage Behavior

Ant Forest is a public welfare initiative that aims to motivate consumers to reduce their carbon emissions. In Ant Forest, traveling by walking, subway, bus, and/or by shared bicycle, online payments for purchases, online payments for utilities and other bills, online registrations, online ticket purchases, and other behaviors that reduce carbon emissions produce green energy in 24 h. Users can use their accumulated green energy to raise a virtual tree. After the tree grows and the user accumulates enough green energy to buy a tree or a piece of publicly protected land online, Ant Forest, public welfare organizations, and environmental protection companies plant a physical tree or guard the corresponding area of protected land in a real area, and grant the user a tree planting certificate with a unique number to cultivate and encourage low-carbon and environmental protection behaviors. Based on the source of green energy acquisition and expenditure direction of the individual Ant Forest account, Ant Forest usage behavior can be divided into three categories: self-participation behavior, reciprocal behavior, and commonweal behavior [18].

Although scholars have varying views about self-participation behavior, most agree that it is important. Consumer self-participation behavior refers to the degree to which consumers participate in the service and delivery of products and services by following a set of prescribed actions [22]. It is voluntary behavior that occurs without employee help or supervision [23]. Ant Forest self-participating behavior is independent behavior in which users initiate action to obtain green energy, such as harvesting their own green energy and planting a tree in their own name.

Reciprocity is a principle that underpins human morality and provides a stabilizing mechanism for social systems [24]. In addition to sociological research, the concept appears in economics, psychology, management, and other disciplines. Because reciprocity spans disciplines, scholars classify it in various ways. Fehr & Gächter (1998) and Offerman (2002) considered reciprocity as a physical response to friendly or unfriendly behavior and divided it into positive or negative reciprocity [25,26]. According to Rabin (1993), reciprocity usually refers to subtle reciprocal friendliness or unfriendliness, i.e., either positive reciprocity or negative reciprocity [27]. Reciprocal behavior in Ant Forest refers to the two-way flow of green energy or cooperative consumption through interaction with friends on the app, and

includes actions such as "stealing" friends' energy and cooperating with friends to plant trees [18].

Commonweal behavior refers to individuals or social groups promoting the development of human welfare by donating to a cause or providing services or caring activities [28,29]. Factors that affect commonweal behavior may be individual factors or social factors. Individual factors include motivation, personality, income, social network, and others [30]. Social factors may be government policies, religion, the transparency of charity, and others [31,32]. Ant Forest commonweal behavior is a one-way action using green energy from one's own account to participate in public welfare projects such as watering trees in public welfare forests [18].

2.3. Hypotheses

2.3.1. Ant Forest Usage Behavior and Low-Carbon Consumption Behavior (LCB)

Low-carbon consumption behavior includes low energy consumption, low pollution and low emissions purchasing, and use and recycling of low-carbon products (including intangible services) [33,34]. In this study, we divided LCB into two dimensions: purchasing low-carbon consumption behavior (PLCB) and habitual low-carbon consumption behavior (HLCB) [35,36]. PLCB refers to reducing carbon emissions by buying energy-saving or low-carbon products [35]. HLCB refers to the adoption of a low-carbon lifestyle through the adjustment of daily living habits and adoption of behaviors that directly reduce carbon emissions [36].

Ant Forest is an online public welfare environmental protection initiative that was launched by Alipay in 2016. Users can reduce carbon emissions by limiting their use of disposable products, improving the efficiency of heating or cooling equipment, using public transportation, and other forms of low-carbon consumption behaviors (HLCB). They can also reduce carbon emissions by purchasing energy-saving appliances and environmentally friendly decorative materials (PLCB). This offline low-carbon consumption behavior is rewarded with green energy from Ant Forest, which can then be used to water the user's own virtual tree [37]. When a certain amount of green energy is accumulated, Ant Forest will plant a real tree in the Chinese desert in the name of the user. This positive feedback is intended to incentivize users to develop low-carbon consumption habits. Based on this, we offer the following hypotheses:

H1. *Ant Forest usage behavior has a positive effect on consumption behavior.*

H1a. *Ant Forest usage behavior has a positive effect on habitual LCB.*

H1b. *Ant Forest usage behavior has a positive effect on purchasing LCB.*

2.3.2. Ant Forest Usage Behavior and Consumption Value

The theory of consumption value is a marketing concept that offers insight into the motivations that underpin consumers' consumption behaviors [38]. Consumption value refers to the utility that consumers realize when purchasing goods or services. In other words, it is the perception and evaluation of value gained in exchange for what is expended (including money, time, energy, etc.) [39]. The consumption values that affect consumer behavior can be divided into epistemic, emotional, social, functional, and conditional values. Consumer value theory has been used in various disciplines, including marketing, economics, psychology, and sociology [38,40,41], and has been shown to have predictive effectiveness [42]. Kaur et al. (2018) analyzed the reasons why people use online social media brand communities from the perspective of consumption value theory [43]. Sweeney (2001) used functional, social, and emotional values to develop a perceived value scale to assess consumers' perception of the value of durable goods at the brand level [44]. After considering the product characteristics of Ant Forest users' usage behavior, we adopted epistemic, emotional, and social values to investigate how consumers' Ant Forest

usage behavior stimulated their daily low-carbon consumption behavior under an S-O-R framework. Epistemic value refers to the perceived utility of a product or service that stimulates intellectual curiosity and provide novelty [45]. Emotional value refers to the perceived utility generated by a product or service that stimulates emotions or emotional state [46]. Social value refers to the perceived utility of a product or service in relation to one or more social groups [47].

Ant Forest users can engage in a range of activities, such as picking green energy, designing virtual trees, and planting trees. A sense of accomplishment is one of the main motivations for people to keep playing online games [48]. Ant Forest provides total energy rankings and weekly dynamic energy rankings, a feature that caters to the top users' sense of accomplishment [49,50]. Other users derive emotional value from their Ant Forest usage behavior. Users need to learn the rules of the game before using Ant Forest, and this encourages them to understand which consumption behaviors will earn green energy. They must acquire green knowledge and understand related environmental protection issues [51]. Thus, they can obtain epistemic value through Ant Forest usage behavior. Previous research indicates that interaction is an important aspect of media use [52,53]. Ant Forest allows users to connect socially by watering a friend's tree or helping others acquire energy [54]. These activities allow users to feel connected to others [55] and thereby feel social satisfaction [56]. When surrounded by friends who use Ant Forest, an individual will likely participate in Ant Forest to fit in and be accepted, thereby acquiring social value.

Therefore, we propose the following hypotheses:

H2. *Ant Forest usage behavior has a positive effect on consumption value.*

H2a. *Ant Forest usage behavior has a positive effect on epistemic value.*

H2b. *Ant Forest usage behavior has a positive effect on emotional value.*

H2c. *Ant Forest usage behavior has a positive effect on social value.*

2.3.3. Consumption Value and Low-Carbon Consumption Behavior (LCB)

Consumption value is key to explaining the purchasing behavior of green products [57], but most of the literature does not explain consumer behavior from the perspective of the values that guide it [58]. In biofuel research, emotional and epistemic values are identified as the main factors that encourage biofuel purchase intention [59]. In studies of bamboo products, epistemic and emotional values have been shown to have a positive impact on purchase intention [60]. Sustainable consumption behavior is an important part of low-carbon consumption behavior and can promote sustainable consumption behavior [61–63], which in turn has a positive impact on low-carbon consumption behavior. For young consumers' sustainable consumption, social and emotional values are significantly related to green purchase intention [61]. Therefore, we offer the following hypotheses:

H3. *Consumption value has a positive effect on consumption behavior.*

H3a. *Epistemic value has a positive effect on habitual LCB.*

H3b. *Epistemic value has a positive effect on purchasing LCB.*

H3c. *Emotional value has a positive effect on habitual LCB.*

H3d. *Emotional value has a positive effect on purchasing LCB.*

H3e. *Social value has a positive effect on habitual LCB.*

H3f. *Social value has a positive effect on purchasing LCB.*

2.3.4. The Mediating Role of Consumption Value

Ant Forest is a simple, enjoyable game that not only provides users entertainment and relaxation, but also allows them to gain a sense of accomplishment and satisfaction by participating in environmental public welfare activities [49]. Ant Forest utilizes a points ranking system that helps activate users' enthusiasm and subjective initiative to participate in public welfare and environmental protection activities. Ant Forest users generate and accumulate green energy through a series of low-carbon behaviors to grow a virtual online tree to a level where the virtual tree can be used to buy a real tree. This design gives users a sense of psychological satisfaction and achievement. Ant Forest has also branched out with themes such as family tree, love tree, and classmate forest to appeal to various social circles and meet the social interaction needs of users in various identity roles and social groups. Consumption value plays an important role in guiding individual consumption behavior, and when users form low-carbon consumption value through their Ant Forest usage behavior, this carries over into their actual consumption behavior. Therefore, we offer the following hypotheses:

H4. *Consumption value positively mediates the relationship between Ant Forest usage behavior and consumption behavior.*

H4a. *Epistemic value positively mediates the relationship between Ant Forest usage behavior and habitual LCB.*

H4b. *Epistemic value positively mediates the relationship between Ant Forest usage behavior and purchasing LCB.*

H4c. *Emotional value positively mediates the relationship between Ant Forest usage behavior and habitual LCB.*

H4d. *Emotional value positively mediates the relationship between Ant Forest usage behavior and purchasing LCB.*

H4e. *Social Value positively mediates the relationship between Ant Forest usage behavior and habitual LCB.*

H4f. *Social Value positively mediates the relationship between Ant Forest usage behavior and purchasing LCB.*

2.3.5. The Moderating Role of Herd Mentality

Herd mentality refers to the psychological phenomenon that people are easily influenced by others in a group and tend to agree with the opinions and follow the behaviors of the majority [64]. Research suggests that very few people are able to remain unaffected by public opinion and that herd mentality is a relatively common phenomenon in society [65]. Sarang Sunder (2019) applied the herd mentality concept to an online rating study to analyze the role of rater experience, product portfolio, and divergent opinions [66]. The main motivation for organic food consumption is health consciousness, and herd mentality amplifies this effect [67]. In addition, herd mentality has a significant positive impact on college students' consumption behavior (Siti et al., 2018) [68]. The Ant Forest app includes joint participation and user interaction features (Ashfaq et al., 2022) [69], and the rank settings stir up competition among users. Given that people are generally affected by the behavior of others [65], we propose the hypothesis that herd mentality affects the value perception of Ant Forest users and thus affects their low-carbon consumption behavior.

H5. *Herd mentality positively moderates the effect of Ant Forest usage behavior on consumption value.*

H5a. *Herd mentality positively moderates the effect of Ant Forest usage behavior on epistemic value.*

H5b. *Herd mentality positively moderates the effect of Ant Forest usage behavior on emotional value.*

H5c. *Herd mentality positively moderates the effect of Ant Forest usage behavior on social value.*

Based on an S-O-R model, we posit that when Ant Forest users adopt a low-carbon environmentally friendly lifestyle with their Ant Forest usage behavior, they are then influenced by other app users. Therefore, we propose:

H6. *Herd mentality positively moderates the effect of Ant Forest usage behavior on consumption behavior.*

H6a. *Herd mentality positively moderates the effect of Ant Forest usage behavior on habitual LCB.*

H6b. *Herd mentality positively moderates the effect of Ant Forest usage behavior on purchasing LCB.*

3. Research Method

3.1. Measurement

The questionnaire was developed by the author together with an instructor, who provided guidance on the questionnaire's design, and two colleagues, who helped translate the instrument and analyze data from the returned questionnaires. The questionnaire was comprised of two parts: respondents' demographics and construct measurements. Extant mature scales were used. Eleven items adapted from Mi et al. (2021) [18] were used to evaluate Ant Forest usage behavior; social value was measured with four items; emotional value was measured with three items; and epistemic value was measured with four items adopted from the study by Lin & Huang (2012) [57]. The scale of purchasing low-carbon consumption behavior was measured with three items, and habitual low-carbon consumption behavior was assessed with five items adopted from the study by Mi et al. (2019) [11]. Herd mentality was assessed with three items adapted from the study by Apuke & Omar (2020) [70]. The questionnaire contained 33 items that were rated on a 5-point Likert scale.

The questionnaire was distributed online via a popular Chinese social media platform (WeChat) to participants who regularly use smartphones. Prior to the study, we conducted a pilot test with 60 participants to confirm the understandability, reliability, and validity of the instrument. For the study, the questionnaire was distributed to 400 participants, who were screened based on whether they had used Ant Forest. After excluding those who had not used Ant Farm, we collected questionnaires from 366 respondents. After further eliminating those with contradictory or missing responses or other anomalies, we obtained valid questionnaires from 298 respondents, for a validity rate of 74.5%. Most respondents (57.4%) were between the ages of 18 and 30, and 54% were female. More than half (66.8%) were undergraduate students. In terms of average monthly income, the majority (53.7%) earned less than 3000 RMB. Table 1 provides the demographics of the survey respondents.

3.2. Data Analysis Procedure

SPSS and MPLUS 4.3 were utilized to analyze the collected data. Firstly, a measurement model was estimated using confirmatory factor analysis (CFA). Measurement quality testing was performed to assess the reliability and validity of the constructs with item measures and the fit of the measurement model. Subsequently, structural equation modeling (SEM) was conducted to assess the proposed model and test the hypothesized relationships. These processes were in accordance with the suggestions of Anderson & Gerbing (1988) [71].

Table 1. Demographics of the survey respondents (n = 298).

Variable	Range	Frequency	Percentage (%)
Gender	Male	137	46%
	Female	161	54%
Age	under 18	5	1.7%
	18–30	171	57.4%
	31–40	83	27.9%
	41–50	38	12.8%
	More than 50	1	0.3%
Income	Less than 3000 RMB	160	53.7%
	3001–6000 RMB	79	26.5%
	6001–9000 RMB	33	11.1%
	More than 9000 RMB	26	8.7%
Marriage	Married	72	24.2%
	Divorced	3	1%
	Single	223	74.8%
Education	High school and below	5	1.7%
	Junior college	30	10.1%
	Bachelor's degree	199	66.8%
	Master's degree	53	17.8 v%
	Doctoral degree	11	3.7%
Job	Student	129	43.3%
	Government and public institutions employ	21	7%
	Freelancer	35	11.7%
	Employees of the private sector Self-employed person	71	23.8%
	Others	42	14.1%

4. Results

4.1. Exploratory Factor Analysis for Ant Forest Usage Behavior

To check the validity of the Ant Forest usage behavior scales, exploratory factor analysis (EFA) was conducted. The appropriateness of factor analysis on Ant Forest usage behavior items (KMO = 0.927, Bartlett's test of sphericity = 2083.456, df = 55, $p < 0.001$) showed that the use of EFA was suitable (Hair et al., 1998) [72]. (see Table 2).

4.2. Measurement Model Testing

Confirmatory factor analysis (CFA) was performed to validate the measurement model. The comparative fit index (CFI), Tucker–Lewis index (TLI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) were computed to assess goodness of fit. The results of CFA indicated that our measurement model fit the data well (x^2 (311) = 1062.776, $p < 0.001$; CFI = 0.886; TLI = 0.871; SRMR = 0.07; RMSEA = 0.09). Table 2 shows that the values of Cronbach's α coefficient ranged from 0.831 to 0.929 for all factors, indicating sufficient internal consistency. Convergent validity was verified by computing the average variance extracted (AVE) and composite reliability (CR) for each construct. All AVE values were greater than 0.50 and CR values surpassed 0.60 (See Table 2), suggesting that the model had good convergent validity (Fornell & Larcker,

1981) [73]. The discriminant validity of the model was tested by comparing the AVE values to the squared correlations between corresponding constructs (Fornell & Larcker, 1981). All AVE values were greater than the squared correlations of paired constructs, reflecting good discriminant validity.

Table 2. Results of the measurement model.

Construct	Item	Item Loading	Cronbach's α	AVE	CR
Herd mentality	HM1	0.861	0.831	0.677	0.893
	HM2	0.844			
	HM3	0.878			
	HM4	0.695			
Ant Forest usage behavior	SPB1	0.884	0.929	0.713	0.964
	SPB2	0.89			
	SPB3	0.847			
	RB1	0.82			
	RB2	0.883			
	RB3	0.86			
	RB4	0.767			
	RB5	0.704			
	CB1	0.881			
	CB2	0.869			
	CB3	0.861			
Social value	SV1	0.793	0.920	0.808	0.944
	SV2	0.935			
	SV3	0.947			
	SV4	0.912			
Emotional value	EmV1	0.921	0.899	0.832	0.937
	EmV2	0.899			
	EmV3	0.917			
Epistemic value	EPV1	0.883	0.896	0.765	0.929
	EPV2	0.886			
	EPV3	0.891			
	EPV4	0.838			
Habitual low-carbon consumption behavior	HLCB_1	0.784	0.856	0.638	0.898
	HLCB_2	0.828			
	HLCB_3	0.814			
	HLCB_4	0.756			
	HLCB_5	0.809			
Purchasing low-carbon consumption behavior	PLCB_1	0.854	0.879	0.734	0.917
	PLCB_2	0.855			
	PLCB_3	0.884			
	PLCB_4	0.834			

In addition, Table 3 provides the value of discriminant validity. The square roots of the AVE of each construct were greater than the values of the correlation coefficient between constructs, which indicated that the discriminant validity was acceptable.

Table 3. Correlation matrix and discriminant validity.

Construct	Mean	S.D.	1	2	3	4	5	6	7
(1) Herd mentality	3.494	0.793	0.677						
(2) Ant Forest usage behavior	3.679	0.765	0.639 ***	0.713					
(3) Social value	3.310	0.957	0.646 ***	0.633 ***	0.808				
(4) Emotional value	3.695	0.873	0.605 ***	0.663 ***	0.755 ***	0.832			
(5) Epistemic value	3.663	0.821	0.587 ***	0.751 ***	0.748 ***	0.751 ***	0.765		
(6) Habitual low-carbon consumption behavior	3.942	0.675	0.494 ***	0.624 ***	0.497 ***	0.538 ***	0.651 ***	0.638	
(7) Purchasing low-carbon consumption behavior	3.841	0.712	0.512 ***	0.603 ***	0.582 ***	0.538 ***	0.643 ***	0.741 ***	0.734

*** $p < 0.001$.

4.3. Structural Model

In order to test the hypotheses, we adopted structural equation modeling. Table 3 shows the estimation results of the path coefficients of the model. The hypothesized associations among research variables were evaluated. The principal effects of Ant Forest usage behavior on purchasing low-carbon consumption behavior and habitual low-carbon consumption behavior were verified ($\beta = 0.201$, $p < 0.001$), indicating that H1a and H1b were supported. Ant Forest usage behavior positively affected epistemic, emotional, and social values (βEPV = 0.531, $p < 0.001$; βEmV = 0.412, $p < 0.001$; βSV = 0.376, $p < 0.001$), supporting H2a, H2b, and H2c. The effect of emotional value on purchasing low-carbon consumption behavior and habitual low-carbon consumption behavior was not significant. Also, the effect of social value on habitual low-carbon consumption behavior was not significant, so it was assumed that H3d, H3c, and H3e were not supported. Social and epistemic values positively affected purchasing low-carbon consumption behavior (βSV = 0.127, $p < 0.05$; βEPV = 0.274, $p < 0.001$), so H3d and H3f were supported. Epistemic value positively affected habitual low-carbon consumption behavior ($\beta = 0.343$, $p < 0.001$); therefore, H3a was supported. (see Table 4).

We used SPSS PROCESS to test the mediation effects, and the results suggested that epistemic, emotional, and social values do mediate the effect of Ant Forest usage behavior on habitual low-carbon consumption behavior. All intervals did not include 0, and the mediation effect sizes were 0.3144, 0.3280, 0.1298, 0.1635, 0.0950, and 0.1970, respectively. Therefore, H4a, H4c, and H4e were supported. It is also seen in Table 5 that there were significant mediation effects between Ant Forest usage behavior and purchasing low-carbon consumption behavior through epistemic, emotional, and social values. All intervals did not include 0, and the mediation effect sizes were 0.3280, 0.1635, and 0.1970, respectively, thus supporting H4b, H4d, and H4f. (see Table 5).

Table 4. Results of SEM for the entire sample.

Hypotheses	Paths	Standardized Coefficient	T-Value	Results
H1a	Ant Forest usage behavior → habitual low-carbon consumption behavior	0.201 ***	4.497	Supported
H1b	Ant Forest usage behavior → purchasing low-carbon consumption behavior	0.187 ***	3.959	Supported
H2a	Ant Forest usage behavior → epistemic value	0.531 ***	13.353	Supported
H2b	Ant Forest usage behavior → emotional value	0.412 ***	8.799	Supported
H2c	Ant Forest usage behavior → social value	0.376 ***	7.476	Supported
H3a	Epistemic value → habitual low-carbon consumption behavior	5.260 ***	0.343	Supported
H3b	Epistemic value → purchasing low-carbon consumption behavior	3.986 ***	0.274	Supported
H3c	Emotional value → habitual low-carbon consumption behavior	0.929	0.052	Unsupported
H3d	Emotional value → purchasing low-carbon consumption behavior	−0.132	−0.008	Unsupported
H3e	Social value → habitual low-carbon consumption behavior	−0.697	−0.036	Unsupported
H3f	Social value → purchasing low-carbon consumption behavior	2.348 *	0.127	Supported
H5a	Int → epistemic value	2.359 *	0.055	Supported
H5b	Int → emotional value	1.021	0.028	Unsupported
H5c	Int → social value	3.419 **	0.100	Supported
H6a	Int → habitual LCB	−0.490	−0.011	Unsupported
H6b	Int → purchasing LCB	1.755	0.041	Unsupported

Note: Int = HM × Ant Forest usage behavior. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 5. Results of SEM for the entire sample (mediation effects).

Hypotheses	Paths	Standardized Coefficient	LLCI	ULCI	Results
H4a	Ant Forest usage behavior → epistemic value → habitual low-carbon consumption behavior	0.314	0.198	0.424	Supported
H4b	Ant Forest usage behavior → epistemic value → purchasing low-carbon consumption behavior	0.328	0.224	0.426	Supported
H4c	Ant Forest usage behavior → emotional value → habitual low-carbon consumption behavior	0.130	0.046	0.230	Supported
H4d	Ant Forest usage behavior → emotional value → purchasing low-carbon consumption behavior	0.164	0.055	0.272	Supported
H4e	Ant Forest usage behavior → social value → habitual low-carbon consumption behavior	0.095	0.014	0.172	Supported
H4f	Ant Forest usage behavior → social value → purchasing low-carbon consumption behavior	0.197	0.105	0.282	Supported

We ran moderated regression models to test the moderating effects. In testing H1 and H2, we found that Ant Forest usage behavior alone had an influence on consumption value and consumption behavior. Thus, we focused our analysis on the relationship between Ant Forest usage behavior, consumption value, and herd mentality, as well as the

relationship between Ant Forest usage behavior, consumption behavior, and herd mentality. According to the results in Table 4, the interaction between Ant Forest usage behavior and herd mentality was significant for social value (β = 0.100, $p < 0.001$), indicating support for H5c. The influence of Ant Forest usage behavior on social value was moderated by herd mentality. In addition, the interaction between Ant Forest usage behavior and herd mentality was significant for epistemic value (β = 0.055, $p < 0.05$), supporting H5a, and the influence of Ant Forest usage behavior on epistemic value was moderated by herd mentality. The moderating effect is depicted in Figures 2 and 3.

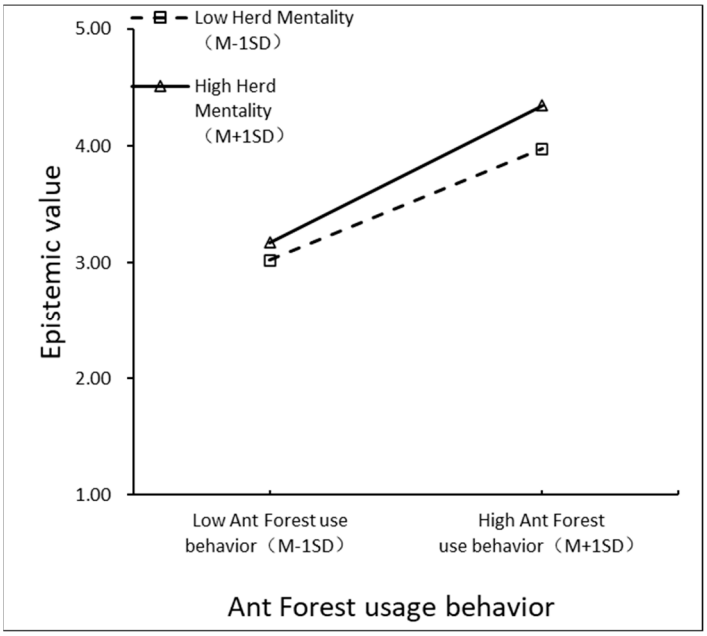

Figure 2. Interaction between Ant Forest usage behavior and epistemic value.

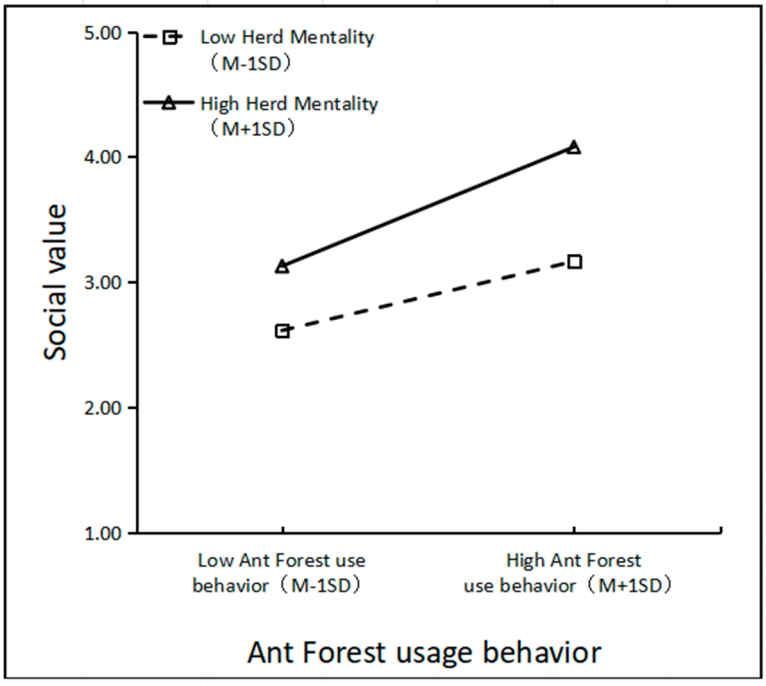

Figure 3. Interaction between Ant Forest usage behavior and social value.

5. Discussion and Contributions

5.1. Discussion

Although scholars have looked into the impact of gaming on green consumption behavior, few studies have examined the relationship between the two from a consumer value perspective. Using Ant Forest as the research object and based on survey data from 298 Ant Forest users, we developed an S-O-R model based on the theory of consumption value and explored the impact of Ant Forest usage on consumer spending behavior. We also examined the mediating effect of consumption value and the moderating effect of herd mentality. On the basis of theoretical analyses, hypotheses of the relationship between the variables were proposed, and empirical analyses were used to verify the validity of these theoretical hypotheses. Most of our hypotheses were supported, indicating that, although Ant Forest is a game, it subconsciously influences consumers' low-carbon consumption behavior.

Firstly, we verified that Ant Forest usage affected users' consumer spending habits. The environmental protection knowledge introduced in the Ant Forest interface together with the experience of obtaining saplings through the game boosted users' environmental concern, prompted them to be aware of their own consumption behavior, and motivated them to adopt both purchasing LCB and habitual LCB. This is in line with Chen et al.'s (2020) study that suggested that digital technology can increase people's willingness to protect the environment [17].

Secondly, the Ant Forest game design provides users with epistemic value (green knowledge), emotional value (satisfaction), and social value (social connection), which in turn leads them to consider their own low-carbon consumption behavior. In this study, an S-O-R model was developed to explain this pathway. Specifically, we found that users acquired relevant, novel, green knowledge through the Ant Forest game, and the perceived value of stimulating intellectual curiosity and providing novel knowledge subconsciously influenced them to adopt habits of purchasing LCB and habitual LCB. The design of Ant Forest's scoreboard gives users a sense of psychological satisfaction and achievement, and this emotional value stimulates a sense of goodwill, enthusiasm, and subjective initiative to participate in public welfare and environmental protection activities. The study by Zhang et al. (2022) also mentioned these ideas [56]. Furthermore, social value is another path that makes Ant Forest users willing to adopt low-carbon consumption behavior. Ant Forest not only meets the social needs of users, but because playing the game generates a tangible benefit for society, users gain satisfaction for being recognized by the community, which further incentivizes them to engage in green behaviors.

Thirdly, we introduced herd mentality as a moderating variable in our study. Because Chinese people generally have herd mentality, when a majority of the population recognize and use a certain app or play a game, others tend to conform. Herd mentality amplifies the experience of Ant Forest users and increases the cognitive and social value of the Ant Forest experience, thereby satisfying users' need for knowledge acquisition, social interaction, and social recognition. However, we found that herd mentality did not enhance users' experience of emotional value, which differed from the findings of Siti et al. (2018) and may be due to the fact that emotional value is more personal and less influenced by the general public [68]. Herd mentality does not play a moderating role between Ant Forest users and low-carbon consumption behavior for several reasons. Firstly, Ant Forest is a game, and as such affects a relatively limited number of people. Secondly, the formation of low-carbon consumption behavioral habits takes time, and a significant herd mentality has yet to manifest.

5.2. Theoretical Contributions

This study offers new perspectives on the promotion of green and low-carbon consumption behaviors. The main theoretical implications are:

The authors postulate that usage of the Ant Forest app affects consumer consumption behavior, thereby enriching previous research on the factors that influence consumer consumption behavior. We determined that using the Ant Forest app affects users' consumer

purchasing behavior and that ongoing use of Ant Forest promotes habitual low-carbon behaviors. These findings extend the extant literature on green consumption, Ant Forest and other pro-environmental platforms, and consumer value. Based on the theory of consumption value and using an S-O-R model, we identified the transmission path of consumption value and ascertained how the usage behavior of Ant Forest users can be transformed into low-carbon consumption behavior. As Ant Forest users gain cognitive, emotional, and social values from their involvement with Ant Forest, they become more willing to engage in low-carbon behaviors. The proposed S-O-R transmission pathway provides a theoretical underpinning for how Ant Forest usage influences consumer behavior. We also explored the influence of herd mentality on changes in consumption value and consumption behavior of Ant Forest users. The herd mentality conformity tendency makes Ant Forest users more amenable to the consumption value provided by Ant Forest and more likely to adopt low-carbon consumption behavior.

5.3. Practical Contributions

Our findings suggest that the Ant Forest app influences users to develop low-carbon consumption habits. Ant Forest offers a novel "online to offline" environmental protection model that can effectively stimulate users' environmental behavior intentions. It would behoove other pro-environmental organizations to consider developing similar platforms, apps, or programs that provide environmental knowledge in a game format and thereby inspire users to develop low-carbon consumption habits. Because consumer value plays an intermediary role between Ant Forest users and low-carbon behaviors, these programs should appeal to users' cognitive, emotional, and social values. First, the knowledge base must be rich enough to meet users' demand for low-carbon knowledge. For example, a green trivia card can pop up when one completes a task. The app should also include competitive elements, such as rankings, challenge lists, etc., that generate satisfaction and increase stickiness. In addition, interactive elements such as cooperative tasks can be incorporated to meet users' social needs. Since users are influenced by herd mentality, platform developers should seek to increase the visibility and attractiveness of small programs or software through e-commerce platforms and social media campaigns, thereby attracting more users to participate in environmental activities.

6. Limitations and Directions for Future Research

Like all research, this study had some limitations. Based on survey data from 298 Ant Forest users, this study established an S-O-R model according to the consumption value theory and concluded that the Ant Forest app influences users' low-carbon consumption behavior. However, as people transition to low-carbon consumption behavior, there can be a rebound effect that was not addressed in this study. Engaging with Ant Forest requires the use of mobile phones or other mobile devices, and these devices draw energy, which contributes to carbon emissions. In addition, Ant Forest's servers also consume energy and produce carbon emissions. This rebound effect needs to be studied and evaluated when assessing the environmental effects of Ant Forest in order to determine its environmental impact more fully.

At the same time, given that Ant Forest is a local app and our survey respondents were mostly Chinese, the possible influence of culture on the results is difficult to rule out. Especially the influence of national herd mentality. People of different cultural backgrounds may have different values and behaviors that might affect their intention to use Ant Forest and their environmental protection behaviors. As Alipay's influence has grown, some countries outside of China have started to emulate Ant Forest with programs such as The Philippine's version of "GCashForest." Therefore, future studies should explore the cultural factors that may affect Ant Forest users and examine different cultural contexts.

In addition, this study considers only the moderating role of herd psychology and the mediating role of consumer value. Other variables that could affect usage behavior, such as role models and usage costs, are excluded from the current model. Therefore, future studies

can introduce other variables to analyze the factors affecting the low-carbon consumption behavior of Ant Forest users.

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References

1. Anderson, T.R.; Hawkins, E.; Jones, P.D. CO_2, the greenhouse effect and global warming: From the pioneering work of Arrhenius and Callendar to today's Earth System Models. *Endeavour* **2016**, *40*, 178–187. [CrossRef] [PubMed]
2. Meehl, G.A.; Zwiers, F.; Evans, J.; Knutson, T.; Mearns, L.; Whetton, P. Trends in extreme weather and climate events: Issues related to modeling extremes in projections of future climate change. *Bull. Am. Meteorol. Soc.* **2000**, *81*, 427–436. [CrossRef]
3. Vlek, C.; Steg, L. Human Behavior and Environmental Sustainability: Problems, Driving Forces, and Research Topics. *J. Soc. Issues* **2007**, *63*, 1–19. [CrossRef]
4. Karl, T.R.; Trenberth, K.E. Modern global climate change. *Science* **2003**, *302*, 1719–1723. [CrossRef] [PubMed]
5. Omer, A.M. Energy, environment and sustainable development. *Renew. Sustain. Energy Rev.* **2008**, *12*, 2265–2300. [CrossRef]
6. Lange, F.; Dewitte, S. Measuring pro-environmental behavior: Review and recommendations. *J. Environ. Psychol.* **2019**, *63*, 92–100. [CrossRef]
7. Sovacool, B.K.; Newell, P.; Carley, S.; Fanzo, J. Equity, technological innovation and sustainable behaviour in a low-carbon future. *Nat. Hum. Behav.* **2022**, *6*, 326–337. [CrossRef]
8. Wan, B.; Tian, L.; Zhu, N.; Gu, L.; Zhang, G. A new endogenous growth model for green low-carbon behavior and its comprehensive effects. *Appl. Energy* **2018**, *230*, 1332–1346. [CrossRef]
9. Lou, L.; Li, L.; Yang, S.-B.; Koh, J. Promoting user participation of shared mobility in the sharing economy: Evidence from chinese bike sharing services. *Sustainability* **2021**, *13*, 1533. [CrossRef]
10. Dumitru, A.; De Gregorio, E.; Bonnes, M.; Bonaiuto, M.; Carrus, G.; Garcia-Mira, R.; Maricchiolo, F. Low carbon energy behaviors in the workplace: A qualitative study in Italy and Spain. *Energy Res. Soc. Sci.* **2016**, *13*, 49–59. [CrossRef]
11. Mi, L.; Gan, X.; Xu, T.; Long, R.; Qiao, L.; Zhu, H. A new perspective to promote organizational citizenship behaviour for the environment: The role of transformational leadership. *J. Clean Prod.* **2019**, *239*, 118002. [CrossRef]
12. Ding, Z.; Jiang, X.; Liu, Z.; Long, R.; Xu, Z.; Cao, Q. Factors affecting low-carbon consumption behavior of urban residents: A comprehensive review. *Resour. Conserv. Recycl.* **2018**, *132*, 3–15. [CrossRef]
13. Shen, Y.; Sun, W. The effect of low-carbon city pilot on energy consumption behavior: Evidence from China. *Energy Econ.* **2023**, *127*, 107047. [CrossRef]
14. Dubois, G.; Sovacool, B.; Aall, C.; Nilsson, M.; Barbier, C.; Herrmann, A.; Bruyère, S.; Andersson, C.; Skold, B.; Nadaud, F.; et al. It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low-carbon futures. *Energy Res. Soc. Sci.* **2019**, *52*, 144–158. [CrossRef]
15. Büchs, M.; Bahaj, A.S.; Blunden, L.; Bourikas, L.; Falkingham, J.; James, P.; Kamanda, M.; Wu, Y. Promoting low carbon behaviours through personalised information? Long-term evaluation of a carbon calculator interview. *Energy Policy* **2018**, *120*, 284–293. [CrossRef]
16. Chen, S.; Li, B.; Zhou, Q.; Liu, H. From Virtual Trees to Real Forests: The Impact of Gamification Affordances on Green Consumption Behaviors in Ant Forest. *Environ. Res. Commun.* **2023**, 1–25. [CrossRef]
17. Chen, B.; Feng, Y.; Sun, J.; Yan, J. Motivation analysis of online green users: Evidence from Chinese "Ant Forest". *Front Psychol.* **2020**, *11*, 1335. [CrossRef]
18. Mi, L.; Xu, T.; Sun, Y.; Zhao, J.; Lv, T.; Gan, X.; Shang, K.; Qiao, L. Playing Ant Forest to promote online green behavior: A new perspective on uses and gratifications. *J. Environ. Manag.* **2021**, *278*, 111544. [CrossRef]
19. Mehrabian, A.; Dan Russel, J.A. *An Approach to Environmental Psychology*; MIT Press: Cambridge, MA, USA, 1974.

20. Islam, J.U.; Shahid, S.; Rasool, A.; Rahman, Z.; Khan, I.; Rather, R.A. Impact of website attributes on customer engagement in banking: A solicitation of stimulus-organism-response theory. *Int. J. Bank Mark.* **2020**, *38*, 1279–1303. [CrossRef]
21. Kim, K.A.; Byon, K.K.; Baek, W.; Wiliams, A.S. Examining structural relationships among sport service environments, excitement, consumer-to-consumer interaction, and consumer citizenship behaviors. *Int. J. Hosp. Manag.* **2019**, *82*, 318–325. [CrossRef]
22. Bendapudi, N.; Leone, R.P. Psychological implications of customer participation in co-production. *J. Mark.* **2003**, *67*, 14–28. [CrossRef]
23. Auh, S.; Menguc, B.; Katsikeas, C.S.; Jung, Y.S. When does customer participation matter? An empirical investigation of the role of customer empowerment in the customer participation-performance link. *J. Mark. Res.* **2019**, *56*, 1012–1033. [CrossRef]
24. Gouldner, A.W. The norm of reciprocity: A preliminary statement. *Am. Sociol. Rev.* **1960**, *25*, 161–178. [CrossRef]
25. Fehr, E.; Gächter, S. Reciprocity and economics: The economic implications of homo reciprocans. *Eur. Econ. Rev.* **1998**, *42*, 845–859. [CrossRef]
26. Offerman, T. Hurting hurts more than helping helps. *Eur. Econ. Rev.* **2002**, *46*, 1423–1437. [CrossRef]
27. Rabin, M. Incorporating fairness into game theory and economics. *Am. Econ. Rev.* **1993**, *83*, 1281–1302.
28. Hu, Y.; Guo, R.; Gong, Y. *Research on Teenagers' Publicwelfare Behavior*; Shanghai Academy of Social Science Press: Shanghai, China, 2020.
29. Kou, Y.; Zhang, Q. Conceptual representation of earlyadolescents' prosocial behavior. *Sociol. Stud.* **2006**, *5*, 169–187.
30. Bekkers, R.; Wiepking, P. A literature review of empirical studies of philanthropy: Eight mechanisms that drive charitable giving. *Nonprof. Volunt. Sec. Q* **2011**, *40*, 924–973. [CrossRef]
31. Clotfelter, C.T. *Front Matter' Federal Tax Policy and Charitable Giving, Federal Tax Policy and Charitable Giving*; University of Chicago Press: Chicago, IL, USA, 1985.
32. Powell, W.W.; Steinberg, R. *The Nonprofit Sector: A Research Handbook*; Yale University Press: New Haven, CT, USA, 2006.
33. Axsen, J.; Kurani, K.S. Social influence, consumer behavior, and low-carbon energy transitions. *Annu Rev. Environ. Resour.* **2012**, *37*, 311–340. [CrossRef]
34. Liu, R.; Ham, J.; Ding, Z.; Jiang, X.; Zhang, H. Sustainable family development: How changes in family life cycle influence household low-carbon use behavior through changing motivations. *Sustain. Prod. Consum.* **2022**, *34*, 271–284. [CrossRef]
35. Barr, S.; Gilg, A.W.; Ford, N. The household energy gap: Examining the divide between habitual-and purchase-related conservation behaviours. *Energy Policy* **2005**, *33*, 1425–1444. [CrossRef]
36. Dai, T.; Hu, H. Analysis of the Influence Mechanism of Low-Carbon Consumption Behavior in Beijing, China. *Adv. Manag. Appl. Econ.* **2022**, *12*, 71–91. [CrossRef]
37. Chen, Y.; Cai, D. Ant forest through the haze: A case study of gamified participatory pro-environmental communication in China. *J* **2019**, *2*, 30. [CrossRef]
38. Tanrikulu, C. Theory of consumption values in consumer behaviour research: A review and future research agenda. *Int. J. Consum. Stud.* **2021**, *45*, 1176–1197. [CrossRef]
39. Sheth, J.N.; Newman, B.I.; Gross, B.L. Why we buy what we buy: A theory of consumption values. *J. Bus. Res.* **1991**, *22*, 159–170. [CrossRef]
40. Khan, S.N.; Mohsin, M. The power of emotional value: Exploring the effects of values on green product consumer choice behavior. *J. Clean Prod.* **2017**, *150*, 65–74. [CrossRef]
41. Shah, S.K.; Zhongjun, P.T.; Oláh, J.; Popp, J.; Acevedo-Duque, A. The relationship between 5G technology affordances, consumption values, trust and intentions: An exploration using the TCV and SOR paradigm. *Heliyon* **2023**, *9*, e14101. [CrossRef] [PubMed]
42. Spiteri, J.M.; Dion, P.A. Customer value, overall satisfaction, end-user loyalty, and market performance in detail intensive industries. *Ind. Mark. Manag.* **2004**, *33*, 675–687. [CrossRef]
43. Kaur, P.; Dhir, A.; Rajala, R.; Dwivedi, Y. Why people use online social media brand communities: A consumption value theory perspective. *Online Inform. Rev.* **2018**, *42*, 205–221. [CrossRef]
44. Sweeney, J.C.; Soutar, G.N. Consumer perceived value: The development of a multiple item scale. *J. Retail.* **2001**, *77*, 203–220. [CrossRef]
45. Hsieh, P.J. Determinants of physicians' intention to use AI-assisted diagnosis: An integrated readiness perspective. *Comput. Hum. Behav.* **2023**, *147*, 107868. [CrossRef]
46. Gonçalves, H.M.; Lourenço, T.F.; Silva, G.M. Green buying behavior and the theory of consumption values: A fuzzy-set approach. *J. Bus. Res.* **2016**, *69*, 1484–1491. [CrossRef]
47. Yu, J.; Zo, H.; Choi, M.K.; Ciganek, A.P. User acceptance of location-based social networking services: An extended perspective of perceived value. *Online Inf. Rev.* **2013**, *37*, 711–730. [CrossRef]
48. Wu, J.H.; Wang, S.C.; Tsai, H.H. Falling in love with online games: The uses and gratifications perspective. *Comput. Hum. Behav.* **2010**, *26*, 1862–1871. [CrossRef]
49. Lai, K.P.Y.; Langley, P. Playful finance: Gamification and intermediation in FinTech economies. *Geoforum*, 2023; *in press*.
50. Spence, J.T. Achievement American style: The rewards and costs of individualism. *Am. Psychol.* **1985**, *40*, 1285. [CrossRef]
51. Zhang, S. How the Internet+ Green Public Welfare Model Cultivates a Low-Carbon and Green Lifestyle: Case of Ant Forest. *J. Urban Plan. Dev.* **2023**, *149*, 04023015. [CrossRef]
52. Nordlund, J.E. Media interaction. *Commun. Res.* **1978**, *5*, 150–175. [CrossRef]

53. Bassey, A.; Meribe, N.; Bassey, E.; Ellison, C. Perceptions and experience of social media use among adults with physical disability in Nigeria: Attention to social interaction. *Disabil. Soc.* **2023**, *38*, 1146–1163. [CrossRef]
54. Hussain, Z.; Williams, G.A.; Griffiths, M.D. An exploratory study of the association between online gaming addiction and enjoyment motivations for playing massively multiplayer online role-playing games. *Comput. Hum. Behav.* **2015**, *50*, 221–230. [CrossRef]
55. Wang, X.; Yao, X. Fueling pro-environmental behaviors with gamification design: Identifying key elements in ant forest with the kano model. *Sustainability* **2020**, *12*, 2213. [CrossRef]
56. Zhang, B.; Hu, X.; Gu, M. Promote pro-environmental behaviour through social media: An empirical study based on Ant Forest. *Environ. Sci. Policy* **2022**, *137*, 216–227. [CrossRef]
57. Lin, P.C.; Huang, Y.H. The influence factors on choice behavior regarding green products based on the theory of consumption values. *J. Clean Prod.* **2012**, *22*, 11–18. [CrossRef]
58. Kilbourne, W.; Pickett, G. How materialism affects environmental beliefs, concern, and environmentally responsible behavior. *J. Bus. Res.* **2008**, *61*, 885–893. [CrossRef]
59. Zailani, S.; Iranmanesh, M.; Sean Hyun, S.; Ali, M.H. Applying the theory of consumption values to explain drivers' willingness to pay for biofuels. *Sustainability* **2019**, *11*, 668. [CrossRef]
60. Yoo, J.J.; Divita, L.; Kim, H.Y. Environmental awareness on bamboo product purchase intentions: Do consumption values impact green consumption? *Int. J. Fash. Des. Technol. Educ.* **2013**, *6*, 27–34. [CrossRef]
61. Awuni, J.A.; Du, J. Sustainable consumption in Chinese cities: Green purchasing intentions of young adults based on the theory of consumption values. *Sustain. Dev.* **2016**, *24*, 124–135. [CrossRef]
62. Biswas, A.; Roy, M. Leveraging factors for sustained green consumption behavior based on consumption value perceptions: Testing the structural model. *J. Clean Prod.* **2015**, *95*, 332–340. [CrossRef]
63. Biswas, A. A consumption value-gap analysis for sustainable consumption. *Environ. Sci. Pollut. Res.* **2017**, *24*, 7714–7725. [CrossRef]
64. Rook, L. An economic psychological approach to herd behavior. *J. Econ. Issues* **2006**, *40*, 75–95. [CrossRef]
65. Lee, C.; Green, R.T. Cross-cultural examination of the Fishbein behavioral intentions model. *J. Int. Bus. Stud.* **1991**, *22*, 289–305. [CrossRef]
66. Sunder, S.; Kim, K.H.; Yorkston, E.A. What drives herding behavior in online ratings? The role of rater experience, product portfolio, and diverging opinions. *J. Mark.* **2019**, *83*, 93–112. [CrossRef]
67. Wang, J.; Xue, Y.; Liu, T. Consumer motivation for organic food consumption: Health consciousness or herd mentality. *Front. Public Health* **2023**, *10*, 1042535. [CrossRef] [PubMed]
68. Siti, N.; Zaqia, R.I.; Suparno, S. Effect of Economic Literacy and Conformity on Student Consumptive Behaviour. *Din. Pendidik.* **2018**, *13*, 198–207.
69. Ashfaq, M.; Zhang, Q.; Zafar, A.U.; Malik, M.; Waheed, A. Understanding Ant Forest continuance: Effects of user experience, personal attributes and motivational factors. *Ind. Manag. Data Syst.* **2022**, *122*, 471–498. [CrossRef]
70. Apuke, O.D.; Omar, B. Modelling the antecedent factors that affect online fake news sharing on COVID-19: The moderating role of fake news knowledge. *Health Educ. Res.* **2020**, *35*, 490–503. [CrossRef]
71. Anderson, J.C.; Gerbing, D.W. Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychol. Bull.* **1988**, *103*, 411–423. [CrossRef]
72. Hair, J.F.; Tatham, R.L.; Anderson, R.E.; Black, W. *Multivariate Data Analysis*, 5th ed.; Prentice-Hall: London, UK, 1998.
73. Fornell, C.; Larcker, D.F. Evaluating structural equation models with unobservable variables and measurement error. *J. Mark. Res.* **1981**, *18*, 39–50. [CrossRef]