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Factors Influencing Tourists' Intention and Behavior toward Tourism Waste Classification: A Case Study of the West Lake Scenic Spot in Hangzhou, China

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Abstract: The increasing amount of tourism waste has been a headache for most tourist destinations in China. Guiding tourists to classify waste has become a key concern for tourism waste management. In this study, the TPB-AR-DH model was constructed for the first time to reveal the formation process of tourists' participation in tourism waste classification. The data came from a questionnaire survey sample of 382 tourists to the West Lake Scenic Spot in Hangzhou. The results from the structural equation model and multiple group analysis showed that (1) attitude towards the tourism waste classification, subjective norm, perceived behavioral control, and ascription of responsibility positively affected tourists' waste classification intention. Especially, the ascription of responsibility was the most influential factor; (2) perceived behavioral control had the largest effects on actual behavior, and waste classification intention played a partly mediating role between perceived behavioral control and actual behavior; (3) tourists' daily habit of waste classification played a significant moderating role between tourists' waste classification intention and actual behavior. On the whole, this study offered a theoretical explanation model to popularize the initiative of tourism waste classification and perfect waste management policies in tourist destinations.

Keywords: tourism waste classification; the theory of planned behavior; daily habit; ascription of responsibility; pro-environmental behaviors

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1. Introduction

Waste management is a vital component of sustainable development around the world. Compared with non-tourist areas, tourist destinations have to face additional challenges related to waste management due to the large number of tourists, the seasonality of tourist flows, and geographical conditions [1,2]. Especially in some popular tourist destinations, tourists generate more waste than residents during the peak tourist season [3]. The increasing amount of tourism waste has been a headache for most tourist destinations, such as plastic, glass, and metal packaging, napkins, food scraps, and so on. For example, in some small island-developing states, such as the Caribbean, tourists produce twice as much waste as residents [4]. Large amounts of tourism waste increase the cost and strain of local municipal solid waste management systems. According to the "reduction, reuse, recycle" environmental protection concept, waste that is not source-separated is difficult or even impossible to recycle, and accurate waste classification means reducing impurities and improving the quality of recycling. The more waste that is sorted, the more material will be recycled instead of going directly to landfill sites or incinerators [5–7]. The waste classification system is related to reducing, reusing, and recycling waste.

Unlike the mature municipal solid waste classification system in developed countries such as Singapore, Japan, and Sweden, China is not yet mature. The history of domestic waste classification in China's megacities dates back to 2000, with a total of eight cities listed as pilot cities. However, the implementation of waste classification is not satisfactory because the vast majority of the public's awareness of waste classification has not been formed. Given this, China has been vigorously promoting mandatory municipal solid waste classification in 46 major cities since 2017, but specific classification policies and standards vary from city to city. Tourists from different cities need to follow the waste classification requirements in different destinations. Therefore, guiding tourists to classify tourism waste has become a key concern for tourist destinations.

Currently, most of the studies focused on Chinese residents' intention and behavior to classify household solid waste and explained the reasons [8,9]. However, few studies focused on Chinese tourists' intentions and behaviors regarding tourism waste classification. The tourism waste classification in this study mainly refers to the classification of waste generated by tourists at tourist destinations, which is mainly divided into four types. First, recyclable waste refers to uncontaminated waste suitable for recycling and resource use, mainly including paper (newspapers, leaflets, magazines, old books, cardboard boxes, and other uncontaminated paper products, etc.), metal (iron, copper, aluminum, and other products), and glass (glass bottles, glass cups, etc.). Secondly, food scrap waste refers to leftover food waste that is carried around, mainly including food remains, tea dregs, fruit remains, fruit shells, and melon peels. Thirdly, hazardous waste refers to waste that is directly or potentially harmful to human health or the natural environment, mainly including waste medicines, waste cosmetics, waste film, and waste photo paper. Fourthly, other waste refers to waste other than recyclables, food scrap, and hazardous waste, mainly including contaminated and non-renewable paper, contaminated or non-recyclable glass, plastic bags and other contaminated plastic products, worn-out ceramics, disposable tableware, cigarette butts, and so on. Unlike the implementation of residents' household waste classification in some pilot cities, tourists come from all over the country, and many of them may not have the habit and cognition of waste classification. There is a long way to go to get full participation in the waste classification program and help tourists develop the habit. Hence, it is urgent to study the formation process of tourists' intentions and behaviors toward tourism waste classification.

What is even more concerning is that there is a paradox between tourists' pro-environmental intentions and their actual behavior. Tourists' intention to engage in pro-environmental behavior tends to be high, but actual pro-environmental behavior is poorly performed. How can we minimize this gap? The habit received attention because of the potential impact of frequently performed behaviors [10,11]. MacInnes et al. [12] argued that tourists' habits drove sustainable behaviors and proposed that pro-environmental behaviors that were strongly habitual were more likely to be enacted on vacation. Thus, the variable of the daily habit of waste classification was used to analyze reasons for the inconsistency between tourists' intention to separate tourism waste and their actual behavior. In the process of implementing new environmental policies, the relevant research showed that the theory of planned behavior (TPB) could well explain the process of human practice of new policies [13]. To improve the explanatory power of the theory, other influencing factors were also added according to different objects and situations. Vaske et al. [14] found that individuals' ascription of responsibility has significant impacts on their intention to practice new environmental policies. However, there is no relevant research on whether the ascription of responsibility in the tourism environment will affect tourists' intentions to classify waste.

Given the limitations of existing research, this study investigates the factors influencing Chinese tourists' intention and actual behavior to classify tourism waste with the extended TPB model by adding the ascription of responsibility and the daily habit of waste classification. Taking the case study of the West Lake Scenic Spot in Hangzhou, this study tries to solve three research objectives. First, to explore factors influencing tourists'

intention and actual behavior toward tourism waste classification. Second, to test whether the daily habit of waste classification plays a significant moderating role in explaining the differences between tourists' waste classification intentions and their actual behavior. Third, to test whether the TPB-AR-DH model, which includes the ascription of responsibility and the daily habit of waste classification, has better explanatory power than the original TPB model. Based on these aims, the study hopes to provide effective suggestions for tourism waste classification management.

2. Theoretical Background and Hypotheses Development

2.1. Theory Background

2.1.1. The Theory of Planned Behavior

The TPB was developed on the basis of the theory of reasoned action (TRA) [15,16]. In order to further improve the predictive power, Ajzen added a new independent variable of perceived behavioral control on the basis of the two independent variables of attitude and subjective norm of the TRA. The TPB suggested that individual behavioral intention was influenced by three core variables, namely attitude, subjective norm, and perceived behavioral control, and that behavioral intention was the most important determinant of human social behavior. However, the individual behavioral intention did not always lead to the actual behavior, since the behavioral intention cannot be the sole determinant of the actual behavior when an individual has incomplete control over the actual behavior. When people felt they could perform certain behaviors successfully, they were more likely to intend to perform those behaviors. This means that perceived behavioral control affected the actual behavior not only directly but also indirectly through the behavioral intention.

As a social psychological theory, the TPB has been used as the basic theory to analyze the formation process of various human pro-environmental behaviors [17,18], such as energy saving [19,20], recycling [21,22], green purchasing [23,24], and so on. In particular, it is also used in the field of research on tourists' pro-environmental behaviors related to waste management, for example, tourists' intention to reduce plastic use after nature-based experiences (a humpback whale encounter) from Australia and Tonga [25], tourists' intention about plastic waste reduction on beaches in Saudi Arabia [26], tourists' waste reduction intention at general US hotels [27], tourists' intention to reduce waste generation in mountainous tourism areas in China [1,13,28], and tourists' waste classification intention in Chinese rural destinations [29]. A common feature of past studies was that scholars extended TPB in different forms according to different research backgrounds, purposes, and contents so as to improve the predictive power of the original TPB model on pro-environment intentions and behaviors. In the context of strengthening the management of household waste classification in China, more and more Chinese tourism scholars have begun to pay attention to the behavior of tourists participating in tourism waste classification. However, overall, the number and depth of research were still insufficient. Therefore, this study also attempted to construct an extended TPB model to explain tourists' intentions and behaviors toward tourism waste classification.

2.1.2. The Extended TPB-AR-DH Model

The original TPB model is a single analysis of influencing factors on behavioral intentions and actual behaviors from the perspective of self-interested psychological factors, ignoring the role of altruistic psychological factors, situational factors, and other factors that work together to influence individual behavior. Existing empirical studies found that there were still many factors that could not be incorporated into the original TPB model to explain people's various intentions and behaviors [30,31]. The current study extended the TPB model from altruistic motivation (ascription of responsibility) to habitual influence (daily habit of waste classification). Not only the rational self-interested motivations of individuals in the behavioral process are considered, but also the important role of irrational altruistic motivations and the spillover effects of the daily habit of waste classification. The TPB-AR-DH model constructed in this study aimed to develop feasible measures to guide

tourists in implementing the behavior of tourism waste classification, providing theoretical references and policy references for tourism waste classification.

2.2. Hypotheses Development

2.2.1. Attitude, Subjective Norm, Perceived Behavioral Control, and Tourists' Waste Classification Intention/Actual Behavior

According to Ajzen [16], in this study, the meaning of attitude towards behavior is the extent to which tourists have a good or bad evaluation of the behavior of tourism waste classification. The meaning of subjective norm is that tourists' perceived social pressure to classify or not classify tourism waste comes from people who have important influences on them. The meaning of perceived behavioral control is that tourists perceive the ease or difficulty of classifying tourism waste in the tourist destination. Based on the existing studies on tourists' pro-environment behavioral intention, in general, if the attitude towards the behavior was more positive, the subjective norm was more favorable, and the perceived behavior control was easier, then the behavioral intention would be stronger [16,28,32]. For example, Chinese tourists' waste classification intention was positively influenced by attitude, subjective norm, and perceived behavioral control in rural tourism areas [29]. For tourists' pro-environment behavior, in general, if perceived behavioral control was easier and the behavioral intention was stronger, then the actual behavioral performance would be stronger [16,33]. For example, Wang et al. [34] found that perceived behavioral control positively affected Chinese tourists' responsible environmental intentions and behaviors, and the intention positively affected the behavior in the Huangshan Mountain scenic spot. However, the results varied depending on the choice of model and area of study [35,36]. For example, attitude did not significantly contribute to predicting tourists' plastic waste reduction intention in Saudi Arabia [26]. Perceived behavioral control also had no significantly positive impacts on youth tourists' waste reduction intentions in South Korea [37]. This is to say that the significance, direction, and magnitude of the influence of these variables in predicting intentions and behaviors will vary depending on situations and behaviors. Therefore, according to the background and purpose of this study, a new validation was necessary. The following hypotheses were proposed in this study:

H1. *Tourists' attitude towards the behavior positively affects their intention to classify tourism waste.*

H2. *Tourists' subjective norm positively affects their intention to classify tourism waste.*

H3. *Tourists' perceived behavioral control of tourism waste classification in the destination positively affects their intention to classify tourism waste.*

H4. *Tourists' perceived behavioral control of tourism waste classification in the destination positively affects their actual behavior.*

H5. *Tourists' intention to classify tourism waste positively affects their actual behavior.*

2.2.2. Ascription of Responsibility and Tourists' Waste Classification Intention

"Protecting the environment is everyone's responsibility" is a value that China has long advocated. Among the various possible additional predictors in altruistic and pro-environmental spheres, the ascription of responsibility was a key variable that explained the formative process of individual intention and behavior [38,39]. Generally, people with strong perceptions of responsibility towards the environment were more likely to engage in environmentally friendly behaviors [40], such as low-carbon transportation usage [14], green lodging [41], and household waste classification [42]. For tourists, perceived destination social responsibility influenced their environmental behaviors [43]. In this study, based on previous research in the context of general pro-environmental and waste classification behavior [38,39], the meaning of the ascription of responsibility is tourists' responsibility consciousness to tourism waste classification in tourist destinations.

The ascription of responsibility is a key factor in tourists' intention to classify tourism waste for two reasons. First, throwing unsorted waste into bins is uncivilized behavior, but it is not illegal in China's scenic areas, and there is no punishment for tourists who do not classify waste. Therefore, a sense of responsibility is one of the prerequisites for tourists to take the initiative to abide by the rules of tourism waste classification. Second, the sense of responsibility for the same behavior will be different from the tourism situation and the daily situation [44]. Tourists had a greater sense of responsibility when they were in the community compared with their sense of responsibility in tourist destinations [11,45]. The classification of domestic waste in most Chinese cities starts in urban residential communities, and the responsibility for domestic waste source classification is clearly vested in each household. People are more likely to consider the environmental impacts when making decisions at home. This was because the public sharing space and the co-existing public could lead to a weakening of individual responsibility [46]. In the tourist destination, the responsibility of source classification of tourism waste is shared by all tourists. Every tourist's sense of responsibility may be reduced, which affects their willingness to classify tourism waste. Therefore, this study attempted to test the effect of tourists' attribution of responsibility on the intention to classify waste in tourist destinations with the following hypotheses:

H6. *Tourists' ascription of responsibility positively affects their intention to classify tourism waste.*

2.2.3. Moderating Role of the Daily Habit of Waste Classification

In psychology, habits are defined as an automatically formed pattern of behaviors that have been repeatedly performed in consistent contexts [47–49]. In this study, the daily habit refers to tourists' habitual behavior of waste classification in daily life. However, there is less understanding of the relationship between tourism practices and everyday pro-environmental activities at home. Some studies have shown that tourists' behaviors in tourist destinations cannot directly influence their behaviors in daily life, but habits in daily life can have spillover effects on their behaviors in tourist destinations. Tourists' pro-environmental behaviors in tourism have deteriorated compared with their everyday pro-environmental behaviors [45]. However, contrary to these studies, Barr et al. [50] found that tourists who had highly supportive environmental beliefs and behaviors in daily life behaved unsustainably when they traveled. For some tourists, travel was not seen as a context for pro-environmental behaviors [51]. The above studies show that the spillover effects of tourists' habitual behaviors in daily life on their behaviors in destinations are a complex process. Based on inconsistent results, this study attempts to clarify the effect of tourists' habits of waste classification in daily life on their behaviors of tourism waste classification in tourist destinations.

Moreover, the reason for the inconsistency between pro-environmental intentions and actual behaviors is a typical academic problem. Liu et al. [52] found that the daily green behavior of tourists at home was a moderator between pro-environmental intentions and actual behaviors in tourist destinations. Similar findings have been found for other behaviors. For example, Limayem et al. [53] found that the habit played a moderating role between the willingness of information systems continuance and actual behavior; when the habit was strong, the relationship between the intention and actual behavior was strong, and vice versa. Most previous studies have focused on generalized pro-environmental behaviors, and the single-specific behavior was relatively weak. There is no research to explore the factors that influence the inconsistency between tourists' intentions and actual behavior to classify tourism waste. Accordingly, the following hypothesis was formulated:

H7. *Tourists' daily habit of waste classification has a moderating effect between tourism waste classification intention and actual behavior.*

Based on the above hypotheses, this study proposed a conceptual model of factors influencing tourists' intention and behavior to classify tourism waste (Figure 1).

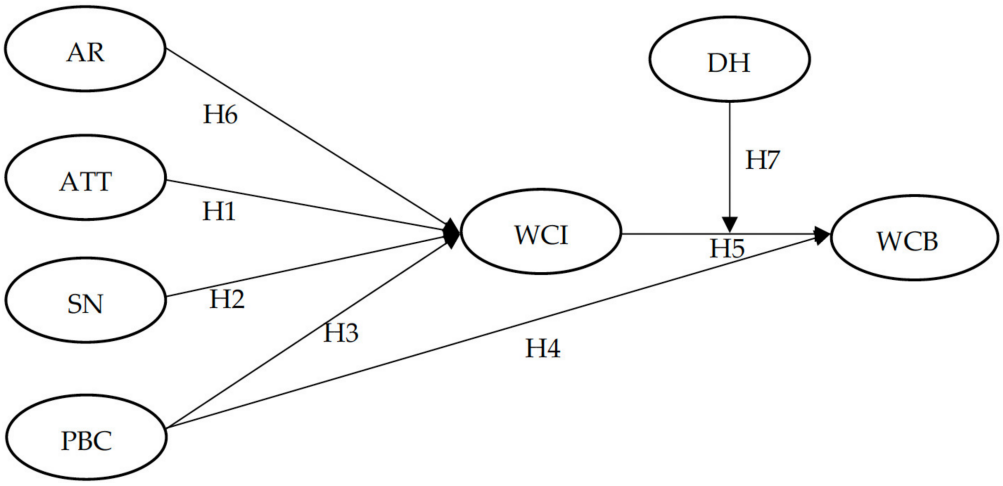


Figure 1. Proposed conceptual model. Note 1: ATT = attitude towards the behavior, SN = subjective norm, PBC = perceived behavioral control, AR = ascription of responsibility, WCI = waste classification intention, WCB = waste classification behavior, and DH = the daily habit of waste classification.

3. Methodology

3.1. The Background of the Study Case

The West Lake scenic spot is located in Hangzhou City, Zhejiang Province, East China (Figure 2). West Lake is a major ornamental freshwater lake in China, surrounded by mountains on three sides and near the city on one side. The scenic area is about 59 square kilometers, of which the lake area is about 6.4 square kilometers; the width is about 2.8 km from east to west; the length is about 3.3 km from north to south; and the circumference is about 15 km (Figure 3). It was selected as one of the "National Top Ten Scenic Spots" in 1985, awarded "National A Grade Tourist Attractions" in 2007, and inscribed on the "World Cultural Heritage" by UNESCO in 2011. For ten centuries, it has been regarded as the spiritual home of the Chinese literatus and a perfect place for modern people to get away from the hustle and bustle of the city.

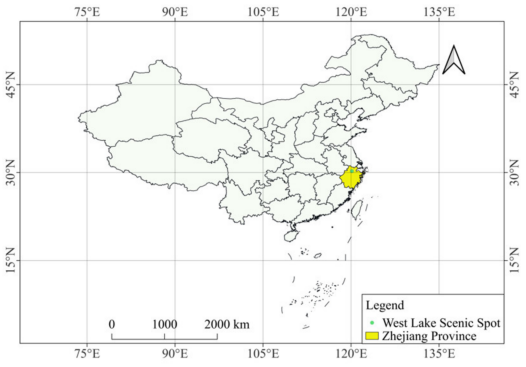


Figure 2. The location of the study area.

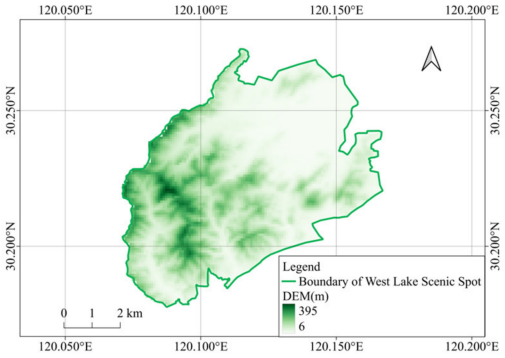


Figure 3. The map of the study area.

Regarding tourists' behavior toward tourism waste classification at West Lake, the reality is that most tourists are accustomed to throwing unsorted waste into bins. However, tourism waste needs to be classified according to the requirements before it can be transported away by waste-cleaning vehicles. Therefore, the behavior of tourists not sorting waste has put great pressure on the cleaning personnel of the scenic spot, and it is necessary for the cleaning personnel to manually classify waste to ensure the smooth transportation and disposal of waste. In China's scenic spots, throwing unsorted waste into bins is uncivilized behavior, but it is not illegal, and there is no punishment for tourists who do not classify waste. Therefore, there are always some tourists who cannot consciously abide by the regulations of waste classification. According to Hangzhou Daily, during the May Day holiday in 2023 (from 29 April to 3 May), West Lake received a total of 2,827,800 tourists, with a daily average of 565,600 tourists, making it one of the top ten popular scenic spots in China. Due to the increase in the number of tourists, the amount of tourism waste has also surged, with a daily average of nearly 150 tons of waste removed. This has become one of the scenic holiday challenges.

From the perspective of a tourist city, Hangzhou is one of the most popular tourist cities in China. It has to deal with a lot of tourism waste, especially at UNESCO World Heritage Sites, and also faces heritage conservation issues. Tourists are not clear about the waste classification system in tourist destinations, which will lead to improper waste disposal. From the perspective of a scenic spot, West Lake is a pilot scenic spot to create a zero-waste scenic spot in China. The zero-waste scenic spot refers to the scenic spot management mode that minimizes the environmental impact of waste by reducing, recycling, and harmless treatment. Waste classification is a key measure to create a zero-waste scenic spot. West Lake has been a pioneer in encouraging tourists to separate waste in recent years, but the desired effect has not been achieved in practice. Regarding the classification and management of tourist waste, West Lake is typical and representative, so it is chosen as a case study to investigate the factors affecting tourists' intentions and the actual behavior of tourism waste classification.

3.2. Questionnaire Design

The questionnaire included three parts. The first part described the background and purpose of this research in words to help the respondents better understand the following questions: The second part was mainly demographic characteristics (a total of five questions, including sex, age, education level, personal monthly income, and whether the daily residence has a garbage sorting policy). The third part included 21 questions on seven latent variables of factors affecting tourists' intention and actual behavior of tourism waste classification.

The measurement items of seven latent variables were mainly derived from existing research on individual environmental behavior in different situations [1,10,16,38,39,41,42,52], including attitude towards the behavior (ATT), subjective norm (SN), perceived behavioral control (PBC), ascription of responsibility (AR), daily habit of waste classification (DH), waste classification intention (WCI), and waste classification behavior (WCB) (Table 1).

Minor modifications were then made to the original measurement items to make them appropriate for this study. The back translation method was used to ensure translation equivalence of measurement items [54]. Each of the seven latent variables was measured by three measurement items using a 5-point Likert scale. Specifically, ATT, SN, PBC, AR, DH, and WCI were from "strongly disagree" (1) to "strongly agree" (5), and WCB was from "never" (1) to "always" (5).

Table 1. Measurement items.

Variable	Items and Sources
ATT	Attitude toward the behavior [1,16,42].
ATT1	I think it is worthwhile for tourists to classify waste in West Lake.
ATT2	I think it is wise for tourists to classify waste in West Lake.
ATT3	I think it is beneficial for tourists to classify waste in West Lake.
SN	Subjective norm [1,16,42].
SN1	People who are important to me agree with me about classifying waste in West Lake.
SN2	People who are important to me want me to classify waste in West Lake.
SN3	People who are important to me think I should classify waste in West Lake.
PBC	Perceived behavioral control [1,16,42].
PBC1	It is easy to classify waste for me in West Lake.
PBC2	I had the time and ability to classify waste in West Lake.
PBC3	It is convenient to classify waste for me in West Lake.
AR	Ascription of responsibility [38,39,41].
AR1	I have the responsibility to promote resource recycling and environmental protection through waste classification in West Lake.
AR2	I have the responsibility to relieve the pressure on sanitation workers through waste classification in West Lake.
AR3	I have the responsibility to protect the sanitation of West Lake through waste classification.
DH	Daily habit of waste classification [10,52].
DH1	I have the habit of classifying waste in my daily life.
DH2	I have paid attention to waste classification policies in my daily life.
DH3	I have learned about the knowledge of waste classification in my daily life.
WCI	Waste classification intention [16,39].
WCI1	I am willing to abide by the waste classification policy in West Lake.
WCI2	I am willing to persuade travel companions to classify their waste in West Lake.
WCI3	I am willing to learn about waste classification in West Lake.
WCB	Waste classification behavior [16,39].
WCB1	I__classified waste in West Lake.
WCB2	I__persuaded your travel companions to classify their waste at West Lake.
WCB3	I__learned about waste classification in West Lake.

3.3. Data Collection

First of all, this study conducted a preliminary survey online. To ensure the representativeness of the respondents, a survey was conducted among 50 visitors who had been to the West Lake Scenic Spot in the past year, and a valid sample of 40 was obtained. After the preliminary survey, some ambiguous items and linguistic errors in the initial questionnaire were modified based on the suggestions. The Cronbach's alpha coefficients were all greater than the threshold value of 0.7, which indicated that the scale has acceptable reliability. At this point, a formal questionnaire was formed.

The formal questionnaire was prepared and published on Wenjuanxing, which is a professional and widely used online questionnaire survey platform in China. This study adopted two sampling methods: convenience sampling and snowball sampling. Convenience sampling refers to the questionnaire link formed by Wenjuanxing being forwarded through the main social media platforms in China, such as WeChat, Weibo, and other means, so that a part of the subjects who meet the general characteristics of the research objectives can answer the questionnaire, and at the same time, the answering population can further forward and spread the questionnaire. Snowball sampling refers

to the fact that some respondents were randomly selected through social media platforms first and then asked for recommendations from respondents who matched the overall characteristics of the research objectives. The two sampling methods were combined until the total target sample was recovered. Considering the timeliness of tourists' travel memories, the research subjects are tourists who have visited Hangzhou West Lake in the past year. From 14 March to 5 April 2020, this survey distributed 400 questionnaires and collected 382 valid questionnaires, for an effective rate of 95.50%.

3.4. Data Analysis Methods

The study used the structural equation model (SEM) to analyze the influencing factors of tourists' waste classification intention and their actual behavior [55]. First, the raw data were coded using SPSS 26.0 to analyze the respondents' demographic characteristics. Second, confirmatory factor analysis was used to evaluate the measurement model in AMOS 26.0. Combined reliability (CR) was used to verify the internal consistency reliability of each measurement dimension [55]. The stronger the correlation between items, the stronger the explanatory power of the latent variables. The standardized factor loading and the average variance extracted (AVE) were used to test convergent validity [56]. Based on Fornell and Larcker [57], if the correlation coefficients between the paired latent variables were lower than the square root of the AVE of each latent variable, discriminant validity was good. Convergence validity and discriminant validity together explain the construct validity of the measurement model in this study. Thirdly, the bootstrap method was used to test whether waste classification intention played a mediating role between perceived behavior control and waste sorting behavior. The bootstrap was 2000 samples and 95% confidence intervals (CI). If 0 was not contained in the confidence interval of direct and indirect influences, the direct and indirect influences existed [58]. Finally, the paired samples t-test function of SPSS 26.0 was used to verify whether there was a statistically significant difference between tourists' intention and actual behavior. If there was, it was necessary to explore the influencing factors leading to the difference. The moderating role of the daily habit of waste classification between tourists' intention and actual behavior was tested by the multi-group analysis [59]. Since the moderator of the daily habit of waste classification was a continuous variable, the daily habit was separated into two subgroups according to the 27% and 73% principle [60]. The averages of the daily habit were ranked from highest to lowest, with the top 27% in the high-level subgroup (n = 144) and the bottom 27% in the low-level subgroup (n = 145). The chi-square (χ^2) difference was used to compare the free model and the constrained model of the two subgroups [61]. If the χ^2 difference between the two models is significant, the two path coefficients have a significant difference, indicating that the daily habit of waste classification has moderating effects.

4. Results

4.1. Demographic Characteristics

The demographic characteristics of the 382 tourists from West Lake scenic spot are shown in Table 2.

Table 2. Demographics of respondents (n = 382).

Variable	*n*	%	Variable	*n*	%
Sex			**Age**		
Male	186	48.69	<17	8	2.09
Female	196	51.31	18–30	254	66.49
Education Level			31–45	88	23.04
Less than High School	32	8.38	46–60	31	8.12
High School/Technical School	83	21.73	>61	1	0.26
Undergraduate Degree	219	57.33	**Monthly Income (RMB)**		
Postgraduate Degree	48	12.56	Under 3000	174	45.55
Does the daily residence have a waste sorting policy?			3001–6000	94	24.61
Yes	232	60.73	6001–9000	72	18.85
No	150	39.27	9000–12,000	22	5.76
			Over 12,000	20	5.23

4.2. Reliability and Validity Analysis

The goodness-of-fit of the measurement model was good (χ^2/df = 2.394, RMSEA = 0.060, GFI = 0.906, CFI = 0.950, IFI = 0.950, TLI = 0.937, NFI = 0.917) [62]. The CR values were between 0.746 and 0.916, indicating that the internal consistency of these variables was acceptable, which was above the critical value of 0.6 [55]. The standardized factor loadings were between 0.626 and 0.903 (p < 0.001) and exceeded the critical value of 0.60 [63], indicating that the observed variables could effectively explain the latent variables [61]. Meanwhile, the AVE values varied from 0.496 to 0.785, which exceeded the minimum of 0.36 [64], suggesting that the scale had accepted convergent validity. As shown in Table 3, convergent and discriminant validity were satisfied in this study. Finally, the results showed that this scale had acceptable reliability and validity.

Table 3. Convergent and discriminant validity of latent variables.

Dim	Item Reliability	Composite Reliability	Convergence Validity	Discriminate Validity						
	Std. Loading	CR	AVE	WCB	WCI	AR	DH	PBC	SN	ATT
WCB	0.626–0.829	0.786	0.554	0.744						
WCI	0.690–0.714	0.744	0.492	0.609	0.701					
AR	0.783–0.838	0.859	0.67	0.360	0.697	0.819				
DH	0.690–0.856	0.834	0.629	0.526	0.558	0.508	0.793			
PBC	0.702–0.823	0.820	0.604	0.592	0.601	0.531	0.557	0.777		
SN	0.817–0.899	0.889	0.727	0.467	0.639	0.633	0.509	0.615	0.853	
ATT	0.856–0.903	0.917	0.786	0.310	0.678	0.631	0.362	0.504	0.573	0.887

Note 1: Diagonal values indicated the square root of AVE of each latent variable. Note 2: Underneath of diagonal indicated the correlation matrix of latent variables.

4.3. Structural Model Evaluation

The goodness-of-fit of the TPB-AR-DH model (χ^2/df = 2.740, RMSEA = 0.068, GFI = 0.906, NFI = 0.919, IFI = 0.947, TLI = 0.934, CFI = 0.947) and the TPB model (χ^2/df = 2.988, RMSEA = 0.072, GFI = 0.915, NFI = 0.926, IFI = 0.950, TLI = 0.935, CFI = 0.949) were acceptable based on [62]. The TPB-AR-DH model (χ^2/df = 2.740) had a better fit than the TPB model (χ^2/df = 2.988). In addition, the TPB-AR-DH model (R^2 = 0.608) had a greater predictive ability for waste sorting intentions than the TPB model (R^2 = 0.559). However, the TPB-AR-DH model (R^2 = 0.424) had lower predictive power for the actual waste classification behavior than the TPB model (R^2 = 0.433). Overall, the TPB-AR-DH model had better predictive power than the TPB model.

For hypothesized relationships (Figure 4), attitude towards the behavior ($\beta_{ATT \rightarrow WCI}$ = 0.268, t = 3.508, $p < 0.001$), subjective norm ($\beta_{SN \rightarrow WCI}$ = 0.166, t = 2.166, $p < 0.05$), perceived behavioral control ($\beta_{PBC \rightarrow WCI}$ = 0.212, t = 3.002, $p < 0.01$), and ascription of responsibility ($\beta_{AR \rightarrow WCI}$ = 0.293, t = 3.699, $p < 0.001$) positively influenced tourists' waste classification intention. Thus, H1, H2, H3, and H6 were supported. Perceived behavioral control ($\beta_{PBC \rightarrow WCB}$ = 0.387, t = 4.835, $p < 0.001$) and waste classification intention ($\beta_{WCI \rightarrow WCB}$ = 0.341, t = 4.139, $p < 0.001$) positively influenced tourists' actual behavior. Thus, H4 and H5 were supported.

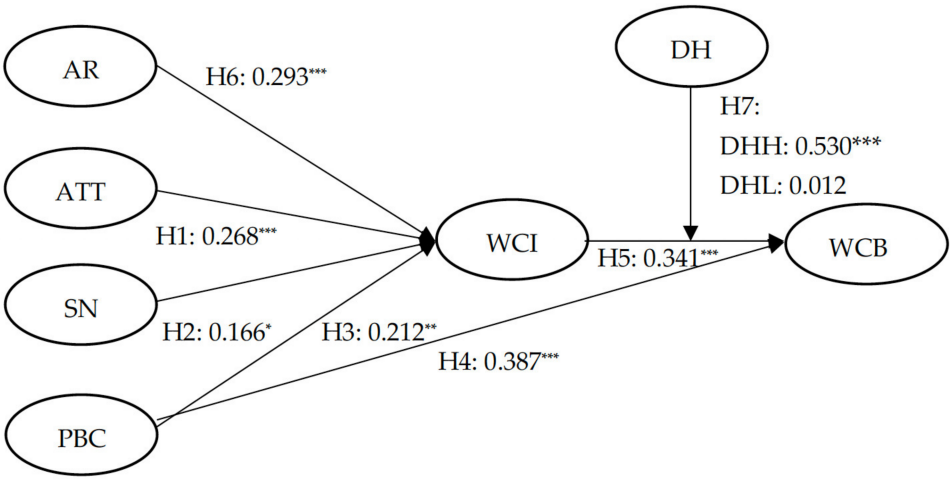


Figure 4. Results of the structural equation model. Note 1: DHH = the high level of daily habit; DHL = the low level of daily habit. Note 2: *** significance at $p < 0.001$, ** significance at $p < 0.01$, * significance at $p < 0.05$.

4.4. The Mediating Test of Waste Classification Intention

In this study, the CI of indirect effects ranged from 0.023 to 0.206, and 0 was not contained, so the mediating effects existed. The CI of direct effects (0.245–0.659) did not contain 0, so the direct effects also existed. Thus, waste classification intention played a partial mediating role. The indirect effects were 0.072 ($\beta_{PBC \rightarrow WCI \rightarrow WCB}$ = 0.072), the direct effects were 0.387 ($\beta_{PBC \rightarrow WCB}$ = 0.387), and the total effects were 0.459 ($\beta_{PBC \rightarrow WCI \rightarrow WCB}$ + $_{PBC \rightarrow WCB}$ = 0.459). All results are shown in Table 4.

Table 4. The result of the mediating effect of waste classification intention.

Path	Effect	Bias-Corrected Percentile		Percentile	
		Lower	Upper	Lower	Upper
PBC→WCB	Total effects	0.332	0.722	0.346	0.737
	Indirect effects	0.023	0.206	0.012	0.186
	Direct effects	0.245	0.659	0.252	0.666

Note: 2000 bootstrap samples; 95% confidence intervals.

4.5. The Moderating Test of the Daily Habit of Waste Classification

The results of the paired samples t-test showed the mean values of tourists' intention and behavior were 4.276 and 3.489, respectively. The mean difference between tourists' intention and behavior was −0.787, the 95% confidence interval was −0.867 to −0.707, and the t-value was −19.418 ($p < 0.001$). Thus, there existed a statistically significant difference between the mean values of tourists' intentions and the actual behavior of tourism waste classification in West Lake (Table 5).

Table 5. The results of paired samples t-test.

	Paired Differences					t	df	Sig. (2-Tailed)
	Mean	Std. Dev	S.E. Mean	95% CI of the Difference				
				Lower	Upper			
WCB–WCI	−0.787	0.792	0.041	−0.867	−0.707	−19.418	381	0.000

This finding of the multi-group analysis indicated that the χ^2 difference between the two models was significant ($\Delta\chi^2 = 9.696$, $p = 0.002$, df = 1). For those tourists with a high level of daily habit, waste classification intention had significantly positive influences on the behavior ($\beta_{DHH} = 0.530$, t = 3.668, $p < 0.001$), while for those tourists with a low level of daily habit, the significantly positive influences did not exist ($\beta_{DHL} = 0.012$, t = 0.100, $p > 0.05$). For tourists with high-level daily habits, the positive impact of the waste classification intention on their actual behavior was significantly higher than that of low-level tourists. As a result, H7 was supported.

5. Discussion

5.1. Factors Influencing Tourists' Waste Classification Intention

The attitude towards the tourism waste classification, the subjective norm from people who had important influences on tourists, and the perceived behavioral control had significant positive influences on tourists' waste classification intention. This finding was consistent with recent studies of Chinese tourists' waste reduction and classification behavior [28,29]. Especially, the ascription of responsibility was the most influential factor in promoting the formation of tourists' intentions in the TPB-AR-DH model. This result confirmed that this study was effective in expanding TPB. The previous study found that the ascription of responsibility had an indirect impact on tourists' pro-environmental intentions in a green lodging context [41].Therefore, this study further expanded the cognition of the relationship between ascription of responsibility and tourists' pro-environmental intention. According to the important influence of the above four variables, specific measures should be taken to improve tourists' waste classification intentions.

First, how can tourists form a positive attitude towards tourism waste classification? Studies have shown that tourists' environmental knowledge has a positive impact on their attitude towards tourism waste management [1]. Hence, to improve tourists' knowledge of tourism waste classification, tourism management departments can distribute the waste classification manual to tourists, which can help tourists quickly understand guidelines for waste classification in the destination. The relevant knowledge can be propagated through various network communication channels, such as the official website, the official application, the WeChat/Alipay mini program, and the radios of the tourist destination. In short, when tourists have enough knowledge of waste classification, it is helpful to form positive attitudes and then increase their willingness to participate in tourism waste classification.

Second, improving the subjective norm through increasing social pressures that tourists feel on whether to classify waste in tourist destinations can be an effective way to encourage higher intentions to classify tourism waste. Tourist destinations are public, shared open spaces, and individual behaviors are monitored by surrounding tourists. Therefore, it is necessary to improve the recognition and enthusiasm of all tourists for the necessity of tourism waste classification and to form an atmosphere of mutual supervision, all of which will help to improve tourists' subjective norms.

Third, to improve tourists' perceived behavioral control, tourism management departments should pay more attention to perfecting public facilities related to waste classification, such as providing enough bins for segregated waste collection, and the bins should be located in such a way that they are easy to find. In addition, as some tourists are not aware of the standards of waste classification in tourist destinations, waste classification

promoters should be arranged to help tourists with waste classification. These measures will help to improve tourists' perceived behavioral control.

Finally, the perception of social responsibility for environmental protection in tourist destinations affects tourists' intentions toward waste classification. According to the result of this survey, the average score of the ascription of responsibility was between 4.411 and 4.476 points, indicating that tourists had a strong sense of responsibility to participate in waste classification in West Lake. This also confirmed that the value of "Protecting the environment was everyone's responsibility" was deeply rooted in the hearts of Chinese people. According to some previous research, tourists had a greater sense of responsibility when they were in the community compared with their sense of responsibility in tourist destinations [11,45]. The result of this study was not exactly the same as the existing conclusions, to some extent. The ascription of responsibility was the most influential factor in the intention of this study. The study showed that when tourists had a strong perception of responsibility for promoting resource recycling and environmental protection, reducing the work pressure of sanitation workers, and protecting sanitation and cleanliness, their willingness to classify tourism waste would increase. Thus, it is effective to increase tourists' waste classification intention by increasing a sense of responsibility for the positive impact of sorting tourism waste in tourist destinations.

5.2. Factors Influencing Tourists' Waste Classification Behavior

The results showed that perceived behavioral control and waste classification intention directly affected tourists' decision-making in actual waste classification behavior, and perceived behavioral control also indirectly affected actual waste classification behavior through waste classification intention. Waste classification intention played a partly mediating role between perceived behavioral control and actual waste classification behavior. It is also worth noting that perceived behavioral control had the largest effects on actual behavior in the TPB-AR-DH model. The result showed that non-volitional variables (perceived behavioral control) were more important than volitional variables (attitude, subjective norm, ascription of responsibility, and waste classification intention), namely, control beliefs (e.g., knowledge and time of waste sorting) and perceived facilitations (e.g., location and number of classified waste bins) were the key influencing factors for tourists' waste classification behavior. This result was consistent with recent studies that stressed the important role of perceived behavioral control [33,34].

5.3. The Moderating Role of the Daily Habit of Waste Classification

The difference between the intention to classify tourism waste and actual behavior was statistically significant, and tourists' daily habit of waste classification played a significant moderating role between the intention and actual behavior. For tourists with a high-level sorting habit in daily life, the positive impact of waste classification intention on actual behavior was greater than the low-level subgroup. In line with the previous studies [44,45,52], these studies showed that tourists' habitual behavior in daily life can have spillover effects on their behaviors at tourist destinations. Based on this survey, more than half of the respondents (60.7%) have implemented the waste classification policy in their daily residences, and 39.4% of respondents have not implemented the waste classification policy in their daily residences. If tourists had the habit of waste classification, paid attention to waste classification policies, and learned about the knowledge of waste classification in daily life, they would be more likely to continue to do so in tourist destinations than people who do not have these habits. Therefore, for China's waste classification policy to be fully implemented in various contexts, whether in habitual environments (e.g., home or work) or non-habitual environments (e.g., tourist destinations), it is crucial to strengthen daily management so that everyone develops the habit of waste classification.

5.4. Research Significance

5.4.1. Theoretical Significance

Based on the original TPB model, the TPB-AR-DH model incorporated the ascription of responsibility to explain the formation of tourists' intention of tourism waste classification and added the moderator variable of the daily habit of waste classification to explain the inconsistency between tourists' intention and the actual behavior of tourism waste classification. Overall, this study provided a new research perspective on tourists' waste classification behavior in China.

For the TPB-AR-DH model, the explanatory power was better than that of the original TPB model. On the one hand, the newly added variable of the ascription of responsibility was the most influential factor in the form of tourists' intention for tourism waste classification. The result enriched our understanding of the relationship between the ascription of responsibility and the intention of tourism waste classification. On the other hand, the study found that the daily habit of waste classification significantly moderated the relationship between tourists' intention to classify tourism waste and their actual behavior, and the high level of daily habit contributed to the conversion from tourists' intention to classify tourism waste into actual behavior. This may be because waste classification is an activity that is repeated with a high frequency for tourists who have already developed the habit of waste classification in their daily lives. Hence, the habit of waste classification in daily life had spillover effects on their behaviors in tourist destinations.

5.4.2. Practical Significance

The initiative of waste classification is related to whether waste can be effectively reduced, recycled, and reused. This study focused on tourists' willingness and actual behaviors to participate in the initiative and provided effective experiences and suggestions to improve tourists' willingness for tourism waste classification.

To begin with, tourists should be strengthened in environmental knowledge education so that they have a positive attitude towards tourism waste classification and an enhanced sense of responsibility for environmental problems. In addition, more waste bins should be supplied to lower tourists' perceived difficulties with waste classification. Furthermore, tourists often travel with family, friends, partners, colleagues, classmates, etc., and are often surrounded by other tourists in the travel situation, so their pro-environmental behavior while traveling is visible to others. Based on this, from the tourists' point of view, they should monitor each other while traveling to better leverage subjective norms. All of the above measures will help increase tourists' willingness to separate waste for disposal.

In particular, this study highlights how tourists' habits of waste sorting in daily life affect tourism waste classification behavior in tourist destinations. Therefore, the practical challenge is to guide the public to develop the habit of household waste sorting in their daily lives and then to narrow the gap between intention and actual behavior in the context of tourism. Everyone should strengthen the sense of ownership of waste classification, establish the concept of "waste classification, starting from me", take waste classification as their unshirkable responsibility, develop the good habit of waste classification in daily life, and use their exemplary behavior to motivate people around them to form a good atmosphere in which everyone is responsible for, participates in, and benefits from waste classification. Tourists' habit of waste classification in daily life is helpful to maximize the spillover effect of daily habitual behavior on tourism waste classification behavior and improve the consistency of intention and actual behavior in a tourism context. These results have practical significance for improving the tourism waste management system and perfecting waste management policies in tourist destinations.

5.5. Research Limitations and Prospects

This study theoretically explored the factors influencing tourists' intention and actual behavior to classify tourism waste in tourist destinations, which can help tourism managers

take relevant measures to improve tourists' waste classification behavior. However, it also included some limitations.

First of all, regarding the location of the case study, this study is conducted in West Lake, Hangzhou, which is a popular tourist destination for all Chinese. In general, for high and scarce tourism resources, tourists are more inclined to carry out pro-environmental behavior. In other tourist areas, tourists' intentions and actual behavior toward tourism waste classification may be different. Therefore, in future studies, the influence of different tourism regions and cultural contexts on the TPB-AR-DH model could be considered.

Secondly, in terms of model construction and variable selection, the TPB-AR-DH model is successfully used to explain tourists' decision-making process of waste classification in tourist destinations and has better explanatory power than the original TPB model, but there is still room for improvement. Therefore, future research could try to use other psychosocial models (such as value-belief norms) or explore other valid variables (such as peer pressure, incentives, cultural backgrounds, etc.) to build models with higher explanatory power.

Finally, regarding data collection, this study relied on self-reported data. Respondents were influenced by social expectations and tended to overestimate their intentions. Therefore, to overcome these limitations, future studies can focus on tourists' actual behaviors of tourism waste classification with other data sources, such as observed data and experimental data. Despite these limitations, the study hopes that the findings from this empirical study can better reveal the influencing factors and mechanisms of tourists' waste classification behavior. Moreover, this study can serve as a reference for related studies in different countries, cultures, and tourist destinations.

6. Conclusions

To meet the needs of theory and practice, the TPB-AR-DH model was developed to explore the influencing factors and formation mechanisms of tourists' waste classification behavior in tourist destinations. First, for tourists' waste classification intention, there were four significant factors, which were attitude towards the tourism waste classification, subjective norms from people who have important influences on tourists, perceived behavioral control, and ascription of responsibility for the tourism waste classification. Especially, the ascription of responsibility was the most influential factor in promoting the formation of tourists' intentions of tourism waste classification in the TPB-AR-DH model. Second, for actual behavior, perceived behavioral control had the largest effects on actual behavior in the TPB-AR-DH model, and waste classification intention played a partly mediating role between perceived behavioral control and actual waste classification behavior. Finally, the difference between waste classification intention and actual behavior was statistically significant, and tourists' daily habit of waste classification played a significant moderating role between tourists' waste classification intention and actual behavior. For tourists with a high-level habit of waste classification in daily life, the positive impact of waste classification intention on actual behavior was greater than the low-level subgroup. On the whole, this study offered a theoretical explanation model to popularize the initiative of tourism waste classification and perfect waste management policies in tourist destinations.

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