Research Article

Recreational Value Assessment of Urban Productive Landscape of Baguatian in Hangzhou Based on Contingent Valuation Method (CVM) and Cloud Computing

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Cloud computing has achieved rapid development in recent years, and the use of cloud platforms to carry various large-scale services has become the general trend of the development of the information industry. This study investigates WTP of Hangzhou residents for the recreational value of Baguatian productive landscapes based on CVM and cloud computing. In this study, we did the related analysis on the social and economic characteristics and WTP of interviewees and made the monetization assessment about the recreational value of its urban productive landscapes. The result shows 62.1% of interviewees have WTP and the average payment intention (WTP) is \$40.74 per year. Besides, the total recreational value of Hangzhou Baguatian productive landscapes is 354 million yuan; the relatively accepted payment mode is tax-paying and cash payment; the educational degree, occupational background, and income are the main factors influencing the tourists' WTP and the correlation between interviewees' origin, permanent residence, and WTP is not apparent.

1. Introduction

With the social and economic development, the demands of urban residents on the public green land have increasingly shown the characteristics of content diversification and functions integration and the construction and application of urban productive landscapes have been more and more emphasized. The productive landscapes, as part of urban green land, as well as owning the main function of the traditional green land, can be an effective bearer of providing village landscape appreciation, agricultural knowledge dissemination, and farming activity experience [1, 2]. Objective understanding and quantitative evaluation on the recreational service value of urban productive landscape not only deepen the urban residents' understanding about the important functions of urban productive landscapes, but also help the city planning, construction, and managerial

department fully recognize the important role of urban productive landscapes. The recreational value of urban productive landscapes belongs to the nonuse value and it can be evaluated with many methods, mainly including TCM (Travel Cost Method), REEM (Residential Environment Evaluation Method), and CVM (Contingent Valuation Method), etc., among which CVM is one of the most widely used methods [3, 4]. CVM mainly uncovers people's largest WTP aiming at the environment improvement or smallest WTA (willingness to accept) when the environment worsens by constructing the imaginary market and do the monetization assessment on the people's preference about the nonmarket goods so as to acquire all the use value and nonuse value related to the environmental goods [5]. Because there is no direct market deal about nonuse value, it cannot be measured with the market price method. The appearance of CVM has solved the difficult problem

bothering people for a long time. As an agricultural science park and historical and cultural park, the Baguatian Scenic Area can produce fruits, vegetables, and food crops throughout the year. It has good economic and landscape benefits and attracts residents of Hangzhou and surrounding areas to enjoy the scenery and pick them, an urban productive landscape with typical and representative significance. Research into the existence value and meaning of Hangzhou Baguatian, a typical representative of urban productive landscapes, is of great reference significance for the following sustainable operation of urban productive landscapes of similar types. The paper adopts CVM to explore the urban residents' WTP and the influencing factors about the recreational value of productive landscapes [6], puts forward specific strategies and suggestions, and provides the scientific examples so as to offer the effective strategy and development suggestions about the development and preservation of productive landscapes in other cities and provinces and even the whole country.

2. Methodology

2.1. Questionnaire Design.

The questionnaire is based on the related design principle of NOAA, pilot investigation results, and received feedback and after constant modifications and perfections, finally confirming the main content of the questionnaire, including three parts:

(1) Main social and economic characteristics of the interviewees, including the gender, age, occupation, education degree, origin, permanent residence, income, etc.

(2) The recognition degree, landscape preference, and satisfaction degree of the interviewees about Hangzhou Baguatian.

(3) The willingness to pay (WTP) of the interviewees about the productive landscape of Baguatian. A certain payment range is given to the interviewees to inquire about the amount of payment the interviewees would like to pay for the productive landscape leisure tourism function.

2.2. Investigation Process.

The time period of this field questionnaire investigation is from March to April in 2018. The questionnaire is randomly handed out in different functional areas in Hangzhou Baguatian according to the research's characteristics and investigation content. To improve the effectiveness of the questionnaire investigation result and ensure that all the interviewees are fully aware of the investigation purpose and questionnaire content, the investigation method of communicating face to face before filling in the questionnaire is adopted [7]. 400 questionnaires are handed out to the tourists in the park and 400 questionnaires are collected on the site, thus making the recovery rate 100%. After deleting the fault questionnaire, 365 effective questionnaires are obtained, so the effective rate is 91.25%.

The size of samples directly affects the research cost, time, and reliability. According to the statistics theory, the sample number (n) of interviewed tourists can be calculated by Scheaffer sampling formula:

$$n = \frac{N}{(N-1)\sigma^2 + 1}. \tag{1}$$

In the formula, n is the number of sampling samples; N is the annual reception number of recreation site; σ is the sampling error, which is usually 6%. Hangzhou Baguatian Park mainly provides the recreational function for the city residents and the total population of Hangzhou is 8.7 million in 2017; therefore, through the calculation by the above formula, the sample number of research questionnaire in the study should be 278. After reserving 25% scrap rate, at least 371 questionnaires should be issued.

2.3. Calculation Method.

CVM allows for the possibility of evaluating the use value of ecological environmental resources, but as this method is based on the virtual market, the result is likely to subjective, different investigation modes and places will cause huge differences, and meanwhile, during the investigation process, the discrepancies of the interviewees' social and economic characteristics and psychology will appear. For example, part of interviewees is likely to make the positive answers due to the consideration of satisfying the investigators, thus causing the deviation. The research adopts the median calculation method, which chooses payment quota of 50% accumulated frequency as the annual WTP value per person, through some rectification, and multiplies the total number in a certain range so as to get the recreational value of Hangzhou Baguatian productive landscapes [8] and uses SPSS19.0 to do the correlation and sensitivity analysis on the factors such as WTP value, the gender, age, occupation, educational degree, and income.

3. Statistics and Analysis on the Investigation Result

3.1. Sample Characteristics Statistics.

(1) *Gender and Age Structure.* In the investigation samples, the males account for 44.9% and the females account for 55.1%. The investigation indicates that the ages of tourists are mainly between 21 and 40, and in this age section, there are 43.21% female tourists, which is far higher than that of the male tourists; the next age section is from 41 to 60, including 17.68% and 16.02% tourists, respectively. For female tourists, the age section below 40 accounts for 77.77%, which is obviously higher than the male percentage of 51% in that age section. In the age section above 41, the male tourists make up for 49%. The age section between 41 and 50 makes up 24% of the total, which is evidently higher than the percentage the females account for in that age section. We can see that the consumption preference of

young females for the leisure agriculture is higher than that of the average people and the females in the age group between 31 and 40 account for the highest consumption structure of leisure agriculture [9]. The middle-aged men are the main consumption group and their percentage is higher than that of the females. It can be learned that young females and intellectual and middle-aged men have the higher preference for the leisure agriculture.

(2) *Cultural and Occupational Background Structure.* The investigation shows that tourists visiting Hangzhou Baguatian productive landscapes are mainly those with higher education, stable career, and higher income. In the sample tourists, the percentage of tourists with college degree and above is 65%; the percentages of junior high school education and senior high school education are 12% and 23%, respectively. In addition to the percentage of people with bachelor's degree and above of 43%, the two cover about 70% in total. From that we can see that the interviewees can fully understand the investigation content. The composition of the occupations nearly covers all the careers in various levels and the percentage of ordinary company staffs is the highest, 31.7%.

(3) *Income Structure.* Tourists accounting for 27.6% are mainly those with monthly income of 4000~6000, 17.9% of tourists' monthly income is below 2000, 18.3% of tourists' monthly income is between 2000 and 4000, and 36.2% of tourists' monthly income is above 6000. These datum show that most of the tourists have a good income and can afford to bring the whole family to enjoy the village.

(4) *Origin and Permanent Residence Structure.* 72.6% residents living in Hangzhou belong to local people and more local people visit Baguatian mainly due to the landscape of Baguatian. Its nature is different from that of Hangzhou West Lake, which is a world-renowned landscape. Baguatian is like the backyard of Hangzhou people, where they can bring their family to enjoy the intense picking fun. 16.9% tourists come from the surrounding counties and cities and 10.5% tourists are from places far away from Hangzhou city outside Zhejiang Province (Table 1).

3.2. Analysis on WTP and the Amount of Payment of Tourists. As shown in Table 2, the tourists willing to pay for the preservation of Hangzhou Baguatian recreational resources account for 36.7%, and the largest amount of WTP is 1000 yuan per year and the smallest amount of WTP is 5 yuan per year. From the percentage of bidding value of tourists with WTP, 100 yuan per year accounts for the most (8.2%), followed by the percentage of tourists willing to pay 10 yuan per year (5.7). All in all, majority of people are willing to pay 200 and below and the percentage is 95.6%. These indicate that the percentage of tourists reduces with the increase of

bidding value and it conforms to the actual payment psychology of common people. Regarding the annual average WTP value, there is still a heated debate about "whether to choose the median value or average value" in the current academic circle. Considering a series of potential problems such as the disperse tendency of interviewees' WTP and the changes of the average value caused by the effect of the extremes, the paper adopts the median value method commonly used in CVM and takes 50% of accumulated payment quota as the annual average personal WTP value. According to Table 2, the value closest to 50% is 49.9% and 63.3%, which is corresponding to WTP value of 40 and 50, respectively; therefore, the median value of accumulated quota is 40.74, meaning that personal WTP is 40.74 yuan per year [10].

There are 231 tourists who refuse to pay the recreational fee for protecting Hangzhou Baguatian. The reasons are shown in the analysis which shows that 3.2% interviewees think that protection work is the responsibility of the country instead of the ordinary residents; 11.2% tourists hold that the recreational resources of Hangzhou Baguatian are good enough and do not need their protection; 22.2% tourists believe that the recreational resources of Hangzhou Baguatian are not rare enough and it is not worth protecting. 19.9% tourists think their income is too low to pay the fee; 10.8% tourists say they are far from there and have no interest in protecting the park voluntarily; 15.5% tourists are worried that the fees they pay are not truly used for the voluntary protection of recreational resources; 17.2% tourists refuse to pay for other reasons. The detailed information is as shown in Table 2.

3.3. Payment Motivation of Tourists. The research into the payment motivation of use value, as one of the important parts to measure the nonuse value, can provide the further reference for scientific and reasonable managerial decisions of the government and the related managerial department. Carson recognizes the payment motivation of use value as value type and thinks the payment motivation of nonuse value includes heritage value, existence value, and option value, which adds up to the nonuse value [11]. The statistical result shows that, in the tourists willing to pay, 64.8% tourists want to ensure the permanent existence of Hangzhou Baguatian's recreational resources; 18.5% tourists want to leave Hangzhou Baguatian's recreational resources to the future generation as heritage; 16.7% tourists want to make themselves, the future generations, and others be able to use Hangzhou Baguatian's recreational resources selectively. We can see that existence value is the main form of Hangzhou Baguatian's recreational resources' nonuse value; the next is the heritage value and the last is option value. It means that only the permanent existence of Hangzhou Baguatian's recreational resources is ensured, making leaving it to the future generation and the future selective use be possible.

3.4. Analysis on Tourists Payment Mode. Since the WTP of interviewees is given based on the imaginary market, the deviation of overestimation or underestimation may appear,

TABLE 1: Basic information of samples.

Factors	Category	Frequency	Percentage	Factors	Category	Frequency	Percentage
Gender	Male	165	44.9		Administrative and public institutions	30	8.2
	Female	202	55.1		Enterprises (including state-owned enterprises, foreign enterprises, and private enterprises)	33	9.1
Age	20 and below	27	7.3		Other provinces in China	116	31.7
	21 to 40	204	55.5	Occupational background	Ordinary enterprise staffs	5	1.3
	41 to 60	106	28.8		Peasants	91	24.9
	61 and above	30	8.1		Freelancers	91	24.9
Educational background	Junior high school and below	32	8.7		Students	60	16.2
	Senior high school/college degree	82	22.3		The emeritus and retired	32	8.6
	Higher vocational college	122	33.3		Hangzhou city	265	72.6
	Bachelor's degree	104	28.4	Origin	Zhejiang Province	62	16.9
	Master's degree and above	27	7.3		Other provinces in China	38	10.5
Monthly income level	2000 and below	66	17.9		Abroad	0	0
	2001 to 4000	67	18.3	Residence	Urban	297	80.9
	4001 to 6000	101	18.3		Suburban	64	17.4
	6000 to 8000	55	14.9		Rural	6	1.6
	8000 to 10000	41	11.2				
	Above 10000	37	10.1				

Data source: investigation data.

TABLE 2: Frequency distribution of interviewees' willingness to pay (WTP).

Payment value of WTP (yuan/year)	Absolute frequency (people)	Relative frequency (%)	Adjusted frequency (%)	Accumulated frequency (%)
5	5	1.3	3.7	3.7
10	21	5.7	15.7	19.4
20	18	4.9	13.4	32.8
30	19	5.2	14.2	47
40	4	1.1	2.9	49.9
50	18	4.9	13.4	63.3
60	2	0.5	1.4	64.7
90	2	0.5	1.5	66.2
100	30	8.2	22.5	88.7
120	1	0.2	0.8	89.5
200	8	2.2	5.9	95.4
300	1	0.2	0.8	96.2
500	3	0.8	2.2	98.4
700	1	0.3	0.8	99.2
1000 and above	1	0.3	0.8	100.0
Refuse to pay	231	36.3		
In total	365	100.0	100.0	

but designing the reasonable payment mode can reduce such kind of deviation to some degree. Through the statistical analysis on the payment mode in the 134 "Willing to Pay" questionnaire, it shows (as shown in Table 3) that 13.2% tourists think that the protection fee should be delivered to the country for the unified allocation in form of paying taxes, and this percentage is the highest in all the payment modes. Besides, 15.9% and 4.4% tourists hold that protection fees should be paid in cash to the managerial institutions or to buy the environmental protection funds or lottery ticket and the proportion of paying to nongovernmental organizations in cash is the lowest (2.5%) [12].

TABLE 3: The modes of WTP.

Payment mode	Frequency (people)	Percentage	Effective percentage	Accumulated percentage
Give it to the country for the unified allocation in form of paying taxes	48	13.2	35.8	35.8
Pay the managerial institute in cash	58	15.9	43.3	79.1
Pay in the form of buying environmental protection funds or lottery ticket	16	4.4	43.3	79.1
Give it to the nongovernmental organizations in cash	9	2.5	6.8	97.8
Other modes	3	0.8	2.2	100.0

3.5. Analysis on Recreational Value. Take the WTP value of investigated tourists as the evaluation index of Hangzhou Baguatian recreational value and do the correlation analysis to WTP with SPSS software. Through the analysis, it can be seen that only 1 person chooses 1000 yuan and above, which is deleted due to its unrepresentative characteristics (Table 2). Use the accumulated frequency median valuation method of WTP in CVM principle to deal with the investigation datum of interviewees and the calculation shows that the average recreational value of Hangzhou Baguatian is 40.74 yuan/person. Take the latest population statistical result of Hangzhou in 2017 as the sample and the total population of Hangzhou is 8.7004 million, meaning that $M = 8.7004$ million. Therefore, the recreational value of Baguatian in 2017 is 354 million yuan through calculation [13].

The nonuse value of recreational resources includes option value, heritage value, and existence value. Existence value refers to the fee people would like to pay for the preservation and the permanent existence of Baguatian recreational resources; heritage value refers to the protection fee the contemporary people would like to pay with the aim of leaving the Baguatian recreational resources to the future generations so that they can benefit from them; option value refers to the future use of the resources' potential function by the individual and society, which means people would like to pay some fees to ensure themselves or others can explore and use the Baguatian recreational resources selectively. In the sample WTP, the payment motivations of tourists for the existence value, heritage value, and option value of the Baguatian recreational resources account for 48%, 25%, and 27%, respectively. Therefore, the existence value, heritage value, and option value of the Baguatian recreational resources in 2018 are 170 million yuan, 89 million, and 96 million yuan.

3.6. Analysis on the Correlation between the Various Samples' Social and Economic Characteristics and WTP and WTP Value. The important methods and key steps of verifying the effectiveness and dependability of CVM are to analyze the effect of all the factors of the total sample on WTP and WTP value according to the effect of personal basic condition of the interviewees on the nonuse value of recreational resources to some degree. Therefore, the paper uses the Pearson correlation analysis in SPSS software to verify the correlation between the social and economic characteristics

of 365 interviewees and WTP and WTP value. According to the personal social and economic characteristics, assign the value in the SPSS software as follows (Table 4).

3.6.1. Analysis on the Correlation between the Samples' Social and Economic Characteristics and WTP. Seen from the analysis on the correlation between the samples' social and economic characteristics and WTP (Table 5), it can be concluded that there is no significant correlation between the interviewees' origin, permanent residence, and WTP while there is positive correlation between the occupational background, educational degree, and WTP. It shows the educational degree, occupational background, and monthly income are the main factors influencing the tourists' WTP. Tourists' gender, understanding degree about Hangzhou Baguatian Park, and the tourism-generating regions have little effect on WTP. The reasons are as follows: the interviewees in the study are mainly young adults and middle-aged men between 20 and 40, whose incomes become relatively stable as the age increases and WTP becomes stronger. In the meantime, it is found that, in the investigation, the higher the educational degree of the interviewees is, the stronger their willingness to protect the recreational resources will become; thus, WTP tends to go up. Besides, some tourists think that Hangzhou Baguatian recreational resources are preserved well and no extra protection fees need to be paid. The main reason is the dispersed responsibility caused by the fact that their residence is far from the Hangzhou Baguatian Park and besides, the gender, origin, and the permanent residence, etc., have no significant influence on WTP [14].

3.6.2. Analysis on the Correlation between the Samples' Social and Economic Characteristics and WTP Value. It can be seen from the analysis on the correlation between the sample's social-economic characteristics and WTP value (as shown in Table 5) that there is a significantly positive correlation between tourists' monthly income and WTP value, but the correlation between other factors and WTP value is not significant; therefore, paying capacity is the main factor influencing the tourists' WTP value. Because the higher the tourists' income is, the stronger the corresponding paying capacity is. As long as they are willing to pay, WTP value will be bigger. It is found in the investigation that some tourists want to pay, but they refuse because they are worried about the specific use of these fees and they are

TABLE 4: Setting of independent variables in SPSS software.

Independent variables	Variables and assignment
Gender	Male = 1; female = 2
Age	[-, 20] = 1; [20, 40] = 2; [41, 60] = 3; [60, -] = 5
Educational degree	Junior high school and below = 1; senior high school or college degree = 2; higher vocational college = 3; bachelor's degree = 4; master's degree and above = 5
Occupational background	Administrative and public institution = 1; enterprises (managerial level) = 2; ordinary company staffs = 3; peasants = 4; freelancers = 5; students = 6; the emeritus and retired = 7
Monthly income level	(-, 2000] = 1; (2001, 4000] = 2; (4001, 6000] = 3; (6001, 8000] = 4; (8001, 10000] = 5; (10000, -) = 6
Origin	Hangzhou city = 1; Zhejiang Province = 2; other provinces = 3; abroad = 4
Permanent residence	Urban = 1; suburban = 2; rural = 3

TABLE 5: The analysis on the correlation between each sample's social-economic characteristics and WTP.

	Gender	Age	Educational degree	Occupational background	Monthly income	Origin	Permanent residence
Correlation coefficient	−0.042	0.003	0.043	0.073	−0.025	0.013	−0.029
Level of significance	0.420	0.999	0.890	0.162	0.630	0.802	0.802

Note. ** means the correlation coefficient is significant at 0.01 level and * means the correlation coefficient is significant at 0.05 level.
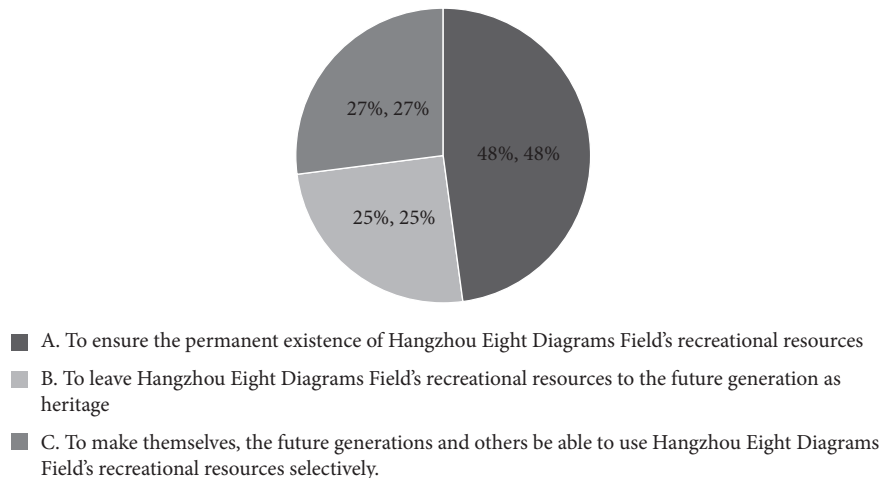

■ A. To ensure the permanent existence of Hangzhou Eight Diagrams Field's recreational resources

■ B. To leave Hangzhou Eight Diagrams Field's recreational resources to the future generation as heritage

■ C. To make themselves, the future generations and others be able to use Hangzhou Eight Diagrams Field's recreational resources selectively.

FIGURE 1: The selection of payment motivation.

■ A. Protecting the recreational resources is the country's responsibility, which should not be shouldered by common residents. 3%
■ B. Recreational environment is good enough and doesn't need protection. 11.30%
■ C. This kind of resources is not rare enough and it isn't worth protecting. 22.10%
■ D. Their income is too low to pay. 19.90%
■ E. Be far away from here and have no interest in the protection of the recreational resources 10.80%
■ F. Be worried that the fees can't be truly used in the protection of the recreational resources. 15.60%
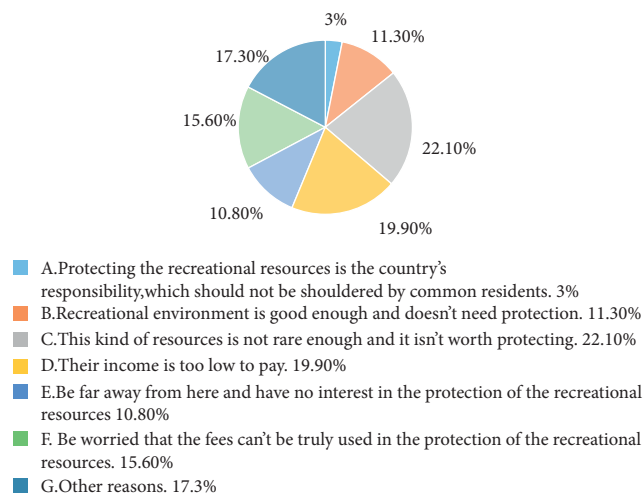■ G. Other reasons. 17.3%

FIGURE 2: The reasons for refusing to pay.

TABLE 6: The analysis on the correlation between each sample's social-economic characteristics and WTP value.

	Gender	Age	Educational degree	Occupational background	Monthly income	Origin	Permanent residence
Correlation coefficient	−0.005	0.076	0.080	−0.073	0.124	−0.087	0.027
Level of significance	0.929	0.147	0.125	0.165	0.524	0.096	0.605

Note. * means the correlation coefficient is significant at 0.05 level.

unclear about the role of resources protection subjects (thinking that it is the country or the government's responsibility to protect the recreational resources, which should not be shouldered by the common residents, as shown in Figures 1 and 2). There is no significant correlation between the tourists' origin, permanent residence, and WTP value for Hangzhou Baguatian Park. With the development of modern society, the income gap between the male and the female is increasingly narrowing down; therefore, the gender difference does not have much effect on WTP value (Table 6).

4. Conclusion and Discussion

The paper adopts the internationally accepted CVM to evaluate the use value of Hangzhou Baguatian recreational resources and does the statistical analysis on the 365 effective questionnaires in the 400 investigation questionnaires and the following conclusions are obtained:

(1) 62.1% of the interviewed tourists are willing to pay for the recreational value of Hangzhou Baguatian Park, which indicates it is of great value significance to protect the recreational resources of Hangzhou Baguatian. The average WTP value is 40.74 yuan/ person per year. In 2017, the recreational value of Hangzhou Baguatian Park is 354 million yuan, among which the existence value of 170 million yuan is the main form of the nonuse value of Hangzhou Baguatian, and next are the heritage value (89 million yuan) and option value (95 million yuan).

(2) 63.2% of tourists have no WTP and refuse to pay for the recreational value of Hangzhou Baguatian Park, mainly because they are unclear about the self-role of protecting the recreational resources. They are worried that the paid fees cannot be fully used for the protection of recreational resources or they are unable to pay the protection fees of Hangzhou Baguatian due to their terrible economic condition.

(3) In terms of payment mode, in the interviewees who are willing to pay, the highest percentage of tourists think that the protection fees should be handed in to the country for the unified allocation in the form of tax-paying (13.2%), the next are the percentages of tourists who hold that protection fees should be paid in cash to the managerial institutions or to buy the environmental protection funds or lottery ticket (15.9% and 4.4% respectively), and the proportion of paying to nongovernmental organizations in cash is the lowest (2.5%).

(4) Seen from the analysis on the correlation between the investigated samples' social and economic characteristics and their WTP and WTP value, there is no significant correlation between the interviewees' origin, permanent residence, and WTP and there is a positive correlation between occupational background, educational degree, and WTP, which means the educational degree, occupational background, and monthly income are the main factors influencing the tourists' WTP. Tourists' gender, the understanding degree about Hangzhou Baguatian Park, and the tourism-generating regions have little effect on tourists' WTP. There is a significantly positive correlation between the monthly income and WTP value and the correlation between other factors and WTP value is not significant, which means that the paying capacity is the main factor influencing the tourists' WTP value. The higher the income of the tourists is, the stronger their paying capacity will become; thus, as long as they are willing to pay, WTP value will be bigger.

CVM is the product under the pure market economic condition. The research on urban productive landscapes that cannot be fully marketized has certain limitations. The academic exploratory nature of its quantitative evaluation still has a certain value, and it needs to be continuously improved in the process of application. 365 samples in the paper are used to represent all the tourists of Hangzhou Baguatian, which will bring about certain deviation. Therefore, multiple methods should be combined to make the comparative analysis so as to make the evaluation result much closer to the actual value of research subjects and put forward a series of realistic suggestions and countermeasures aiming at the development and preservation of the productive landscapes similar to Hangzhou Baguatian to help promote the productive landscapes in the whole province and even the whole country [15].

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgments

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