ORIGINAL ARTICLE

Influencing the Willingness to Pay for Urban Park Service Functions

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Abstract

The contingent valuation method (CVM) was used along with a questionnaire survey and field research methods to analyze the factors affecting willingness to pay (WTP) for urban parks in Tai'an. The results indicated that roughly 50% of the residents visited the urban parks weekly. Doing physical exercises and viewing topped the list of activities. Residents of different characteristics had different WTPs for the service functions of urban parks. From the two surveys, 60.1% and 61.4% of residents would be willing to pay. The average individual WTPs were 42.2 yuan·a^{-1} and 43.1 yuan·a^{-1} in the two surveys, and the medianin dividual WTP was 20.0 yuan·a^{-1}. WTP was mainly affected by satisfaction, and WTP value was mainly affected by education level and income. Other factors had some correlation, but none were significant. Finally, some useful suggestions and references were given to the government in order to enhance the urban park services proposal.

Key words : Urban park, Willingness to pay (WTP), Contingent valuation method (CVM), Correlation analysis

1. Introduction

Urban green spaces as a kind of environmental resource are not only natural resources but also highly artificial products, playing a more and more important role in improving living environments (Fang and Wang, 2010). The service function of this resource is an issue for urban planning and city ecology. Post-occupancy evaluation (Deng and Bao, 2006), accessibility (Xiao et al., 2009), and the consumption characteristics of green spaces (Jiang et al., 2010) are discussed, and the contingent valuation method simulates the market value assessment. The contingent valuation method（CVM）has been the most widely used method of assessing the values of public goods in environmental economics both domestically and abroad in recent years. It is the construction of hypothetical markets that reveals peoples tmaximum willingness to pay (WTP) for environmental improvements or the minimum compensation (WTA) for environment deterioration. In a word, people express their willingness to pay or receive compensation in simulated markets (Zhang and Cai, 2005). In 1963, Davis first applied CVM in studying the recreation values of forests in Maine, in the United States (Davis, 1963). The method has also

been used for the evaluation of public goods and related policy. In China, the basic concepts of CVM were introduced in the 1980s, and case studies appeared in the 1990s. Study areas were concentrated on living environments, ecological systems, and tourism resources, and in recent years, there have been studies on urban green spaces (Wang, 2003; Song et al., 2010).

This article takes the urban parks in Tai'an as the subject. The factors that influence the willingness to pay for urban parks were analyzed using CVM combined with a questionnaire survey, on-site investigation, and the correlation analysis method. Scientific advice is provided through the analysis of the main factors and their influence on the local urban parks.

2. Experimental

2.1. Study areas

Tai'an City is situated in central Shandong Province, south of Taishan Mountain, and is characterized by culture and tourism. This article took urban parks as its subjects: Donghu Park, Nanhu Park, Hushan Park, Longze Park, and Longtan Park (Fig. 1). Respondents were chosen randomly from among visitors to these parks. Donghu Park, Nanhu Park, and Hushan Park

Fig. 1. The distribution of the public parks.

are located in the east of Tai'an City, Longze Park is located in the west of the city, and Longtan Park is located in the north of the city. Thus, the survey results reflect the diversity of park users.

2.2. Study methods

CVM was used with a questionnaire survey to assess the non-use aspects of urban parks, and the survey was carried out in three stages. Stage one was the pre-investigation phase, in September and October 2009. The questionnaire was modified following experts' advice. The experts were from the fields of city planning, landscape architecture, horticulture, ecology, and environmental science. Stage two was a small survey phase in October and November 2009. The bidding starting point and numerical interval range were adjusted based on the feedback in order to reduce the starting point deviation. In stage three, questionnaire surveys were independently administered to visitors in two groups from March to June 2010. The questionnaire asked about the following: (1) visitors' urban park visitation habits; (2) visitors' willingness to pay for urban parks and their development; and (3) visitors' personal demographic factors.

The study selected the payment card approach. The problems associated with the alternative methods could be fairly significant in the context of the study topic. Dichotomous bidding was less suitable because of resource constraints. The open-ended question method was not chosen because most people may not understand the notion of purchasing public environmental resources. The payment card approach offered a compromise. The presentation of bid amounts could be facilitated by using visual aids to expedite and improve the survey process.

The results were analyzed using SPSS 16.0 software. Descriptive statistics analysis (Huang et al., 2010) and double variable Spearman correlation analysis (Xu et al., 2007) were used tocompare the results

with data from domestic and foreign research.

In order to facilitate the statistical analysis, the survey results from group 1 were recorded as T1, and the results from group 2 were recorded as T2. The ratios of students in T1 and T2 were, respectively, 19.8% and 27.0%. Because students have no income and had random willingness to pay, the data from students were removed in similar studies (Zong et al., 2008). After students were removed, the numbers of valid questionnaires at T1 and T2 were 294 and 282.

3. Results and discussion

3.1. Investigation and analysis of urban parks' service function

It can be seen from Table 1 that there were more males than females. Approximately 50% of interviewees were between ages 18 and 35. The education level of the users was high-60% or so of the interviewees had attained higher education. For income, roughly 60% earned 1,000-3,000 yuan per month. Forty percent to 50% respondents were satisfied with urban parks, and 50% or so of respondents visited the park weekly; however, still 10%-20% respondents rarely went to the parks. Chi-square tests were conducted on the respondents' data, p values were between 0.069 and 0.864 ($p > 0.05$), and the results showed that the samples were representative.

The survey gathered information on companionship and on respondents' reasons for visiting urban parks. Regarding companionship, 30.9% were solitary visitors and 46.5% visited with family members, of whom 20.3% visited with their children. Beyond family, 16.9% visited with neighbors and friends, and

Table 1. Demographic profile of respondents

Demographic variables		T1 (%)	T2 (%)	X^2	df	p
Gender	Male	53.6	58.9	0.509	1	0.476
	Female	46.4	41.1			
Age	18-35	50.8	50.0	2.119	2	0.347
	35-55	31.1	38.5			
	>55	18.1	11.5			
Education	Primary	10.2	7.9	0.292	2	0.864
	Secondary	29.4	31.4			
	Higher level	60.4	60.7			
Income	<¥1000	16.4	11.4	2.401	3	0.493
	¥1000-3000	74.4	75.0			
	¥3000-5000	7.8	11.1			
	>¥5000	1.4	2.5			
Satisfaction with urban parks	Very satisfied	7.6	11.1	3.700	3	0.296
	Comparatively satisfied	33.4	42.5			
	Basically satisfied	48.8	40.4			
	Dissatisfied	10.2	6.0			
Frequency of visiting urban parks	1-2 times/day	18.8	10.4	7.093	3	0.069
	1-2 times/week	42.3	38.6			
	1-2 times/month	29.7	31.0			
	1-2 times/year	9.2	20.0			

5.7% came with (Fig. 2). These findings suggest that urban parks could strengthen family ties by providing places for family and neighbor interactions. Urban park visits are induced by multiple motives, the understanding of which could inform park design and management. The most common activities were doing exercises or spending leisure time (Table 2). Chatting and taking children to the playground received less support. The ratio of enjoying nature was very low. Some residential areas lacked green spaces, and residents were unable to do exercises or have communication activities, so they selected urban parks. In addition, because the air quality of Tai'an and the overall greenery are pleasing, residents seldom selected urban parks to enjoy nature. They would choose Mount Taito if they wanted to experience wild nature.
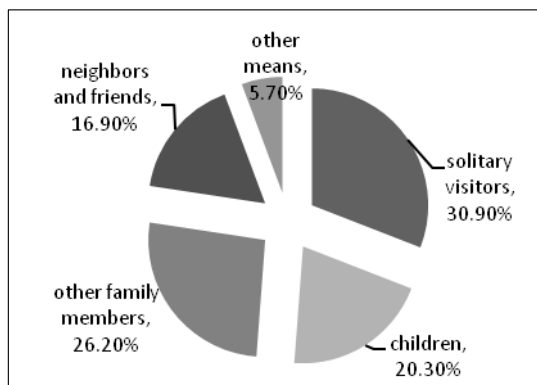

Fig. 2. Companions during visits to urban parks.

3.2. Analysis of WTP and WTP values

The WTP rates at T1 and T2 were 60.1% and 60.4%, and the rates of zero WTP at T1 and T2 were 39.9% and 39.6%, both respectively. These rates were rather low compared with the results from similar studies (Xu et al., 2007). The rates of zero WTP were higher than those in the international research statistical data (20%-35%). The existence value, option value, and heritage value of urban parks were, respectively, 40.3%, 38.2%, and 21.5%. Thus, more people were willing to pay for urban parks' long-standing value. The questionnaire also analyzed the reasons for. From 50% to 60% agreed that "the government should provide the funds" and explicitly refused to pay. Respectively, 15% and between 20% and 30% of respondents chose low income and Five percent or so refused because they could not enjoy the urban parks, but they would pay if the urban parks were more convenient.

The average WTP values at T1 and T2 were, respectively, 42.2 yuan per year^{-1} and 43.1 yuan per year^{-1}, the median value was 20.0 yuan per year^{-1}, and the error of the average value was 2.1%. The repeatability of data was good, and respondents' WTPs were relatively consistent between the two investigations. With regard to relevant research both domestic and abroad, WTP values were different in different regions; for example, in surveys in Hangzhou (Wang,2003), Guangzhou (Jimand Wendy,

Table 2. Reported activities at urban parks

Activities	Often	Sometimes	Seldom	分Score
Physical exercise	42.30%	34.10%	23.60%	2.19
Leisure and viewing	43.60%	28.60%	27.80%	2.16
Chatting	40.40%	30.8%	28.8%	2.12
Taking children to playground	32.1%	39.3%	28.6%	2.04
Enjoying nature	26.4%	37.5%	36.1%	1.90
Other activities	12.7%	30.4%	56.9%	1.56

Note: score, 3 = often, 2 = sometimes, 1 = seldom.

Table 3. Distribution of WTP values

WTP value (yuan)	T1 (%)	T2 (%)	WTP value (yuan)	T1 (%)	T2 (%)
1	2.8	2.4	50	15.4	16.0
5	8.5	18.9	100	13.1	16.0
10	25.0	19.5	150	2.8	3.6
20	14.8	12.4	200	2.8	3.0
30	14.8	8.3			

2006), and Zhuhai (Wendy and Jim, 2008), WTP values were, respectively, 36.09 yuan per year^{-1}, 17.40 yuan per month^{-1}, and 167.84 yuan per year^{-1}. WTP values were related to urban parks and residents' living levels. The amounts in Tai'an were relatively low.

3.3. Analysis of factors influencing WTP and WTP values

The demographic characteristics collected from the sample were gender, age, education, income, satisfaction, and frequency. These six factors were determined on the basis of similar studies and a pre-survey. The double variable Spearman correlation was analyzed using SPSS software. WTP had a significant correlation with education and satisfaction at T1 but only with satisfaction at T2. Gender and age showed different effects at T1 versus T2. Frequency was negatively correlated with WTP; that is, people who often used the urban parks had high WTP rates. WTP values had significant correlations with education and income at T1 and T2. Other factors such as gender, satisfaction, and frequency were negatively correlated with WTP values. Respondents tended to pay more with the following characteristics: male, high satisfaction, and high frequency. That is, people with high education, income, and satisfaction levels showed higher WTPs and WTP values.

Table 4. Analysis of the factors influencing WTP

influencing factors	T1		T2	
	correlation coefficient	Sig.	correlation coefficient	Sig.
Gender	0.060	0.305	-0.21	0.727
Age	-0.007	0.905	0.081	0.179
Education	0.152**	0.009	0.023	0.696
Income	0.072	0.216	0.086	0.150
Satisfaction	-0.198**	0.001	-0.165**	0.006
Frequency	-0.057	0.331	-0.056	0.347

*P < 0.05, **P < 0.01

Table 5. Analysis of the factors influencing WTP value

influencing factors	T1		T2	
	correlation coefficient	Sig.	correlation coefficient	Sig.
Gender	0.060	0.305	-0.21	0.727
Age	-0.007	0.905	0.081	0.179
Education	0.152**	0.009	0.023	0.696
Income	0.072	0.216	0.086	0.150
Satisfaction	-0.198**	0.001	-0.165**	0.006
Frequency	-0.057	0.331	-0.056	0.347

*P < 0.05, **P < 0.01

4. Conclusions

4.1. Analysis of influencing factors using the contingent valuation method

Questionnaire design is the key to the success of CVM. The first part of this study's questionnaire, on use of urban parks, involved more questions and required more time, and therefore some surveys were incomplete. Additionally, the wording of the second part was too literal to understand when it should have been more user-friendly. The third part, individual demographic characteristics, was considered private, and adequate answers were not provided.

The data were analyzed using SPSS. Descriptive statistical analysis is often used to analyze the demographic characteristics of samples. A logit model (Huang et al., 2010), bilateral Spearman rank correlation analysis (Xu et al., 2007), regression analysis (Zong et al., 2008), and a probit model (Wang and Zhang, 2009) were used to analyze the relationships between demographic characteristics and WTP and between characteristics and WTP values. Marcos et al. (2010) used semi-parametric modeling and genetic programming as opposed to probit and logit models. The results showed that the new method could perform data processing well, but the computation was extensive and not suitable for popularization. The study then used the chi-square method to test the demographic characteristics of the samples and bilateral Spearman rank correlationan alysis to test the relationships between demographic characteristics and WTP and between characteristics and WTP values. This method was scientific and reliable.

This article used repetition of the target population to test CVM reliability. The research method reflected this repetitiveness, with investigators in two groups (with two graduates and five undergraduate in each group) investigating successively and independently. In addition, owing to weekdays and weekends, the intervals of investigation were somewhat longer to ensure the objectiveness of the data.

4.2. Conclusion

The results indicated that roughly 50% of the residents visited urban parks weekly. Doing physical exercises and viewing topped the list of activities. Residents of different demographic characteristics, such as gender, age, education, satisfaction, and frequency, had different WTPs for urban park service functions, with 60.1% and 61.4% of residents from two surveys reporting a willingness to pay. The average individual WTP was 42.2 yuan·a^{-1} in one survey group and 43.1yuan·a^{-1}in th eother; the median individual WTP was 20.0yuan·a^{-1}. WTP was mainly affected by education and satisfaction at T1,whereas it was mainly affected by satisfaction in T2. WTP values were mainly affected by education and income. Other factors had some correlation but none weresignificant.

4.3. Suggestion

Fifty percent or so of the residents go to the urban parks every week, but 10%-20% or residents seldom or never go to the parks. Roughly 80% of residents participate in physical exercises and leisure activities. Urban parks provide places for people to exercise, rest, and communicate. Therefore, the next step is to design landscape, facilities, and spaces in order to suit residents' needs.

Residents with different incomes, education and satisfaction levels, and frequency will have different WTPs. All of this information will help local governments understand what factors influence residents' attitudes and actions. The results also showed that raising residents' income and education levels, increasing urban green spaces, and enhancing communication between the government and residents would increase the government's credibility with the public. The Tai'an city plan for 2010-2020 states: "The rate of green spaces will reach 35%, green coverage 45%;

park per capita will reach 10.23m.[2]At the same time, comprehensive parks, community parks, and special parks will be developed properly; the construction of riverside parks and greenbelts along streets will receive more attention." All of the se plans are in line with this article' sresults. These measures can enhance the government's credibility with residents, improving their understanding and attitudes toward urban parks, all of which will beconducive to the development of urban greenspaces.

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