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Article

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A Study of the Economic Valuation of the Saryeoni Forest Path Utilizing the Contingent Valuation Method

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ABSTRACT

Countries throughout the world are developing a wide variety of tourism resources, including pristine natural resources, to enhance local brands and attract tourists. Walking tourism has become increasingly prominent with the recent popularity of healing and relaxation. To estimate the non-market value of walking tourism, this study evaluates the economic value of the Saryeoni forest path on Jeju Island using the contingent valuation method (CVM). Payment, gender, age, visit experience, education level, visitor composition, income level, and purpose of visit are used as demographic and control variables. The value is estimated using the double-bounded dichotomous choice method and by assuming a logit distribution, which is known to be stable, for tourists' willingness to pay (WTP). The WTP truncated mean per capita is estimated to be KRW 2,294. This indicates that the recreational value of the Saryeoni forest in Jeju is roughly KRW 1.05 billion per year.

Keywords: Tourism resource, Contingent valuation method, Willingness to pay, Tourism development

1. Introduction

The demand for tourism is a phenomenon of modern society and a significant influence in our lives. Tourism patterns have diversified from pre-tour planning and management systems to tailor-made tourist spots by tourists (Tomas et al., 2018; Martin, 2018). In this regard, national and local governments are making an all-out effort to develop a variety of tourism resources to revitalize their local economies by attracting tourists since the tourism sector has positive economic, socio-cultural, and environmental

effects (Martin & Martina, 2018).

Changes in socioeconomic conditions, particularly the environmental pollution and expanded leisure time caused by industrialization and urbanization, have increased public desire to experience intact nature fully. With increasingly diverse demands for tourism, programs protecting natural resources have also become excellent tourism resources. Areas such as natural parks, in particular, enhance the physical and mental fitness of visitors, by allowing them to relieve stress and escape from their daily routines (Nowak et al., 1998; Chiesura, 2004).

People today, who are burned out by continuous competition and dehumanization, have been seeking a new breakthrough. Walking tourism, based on the 'slow' or 'leisure' concept, is recognized as an alternative that might address their needs (Choi & Lee, 2011).

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Forest paths, a common natural resource used in public tourism programs, have inflexible characteristics since they are in limited supply and their price does not change based on demand. In this regard, it is imperative to estimate the value of walking tourism of natural resources since the social and environmental benefits are large.

Walking tourism has been studied extensively by scholars, who have mainly focused on hiking, trekking, long-distance walking, analysis of walking courses, and the economic impact on local community (Briedenhann & Wickens, 2004; Gyimothy & Mykletun, 2004; Morris, 2006; Gu & Ryan, 2008; Breejen, 2007; Roberson & Babic, 2009; Chhetri & Arrowsmith, 2014). However, our understanding of the exact, tangible value of leisure provided by natural resources is limited in spite of fast-paced growth in this area. That is, because the environment and environmental goods (often referred to as non-market goods) are non-tradable public goods, evaluating their value to visitors is difficult. Since these tourism resources are not priced through market transactions, an alternative method must be adopted to estimate tourists' willingness to pay (WTP) for access to them.

There are several methods for estimating the non-market goods like natural tourism resources, but the most efficient and widely-used methods for estimating the value of tourism resources are the travel cost method (TCM), Hedonic Price Method (HPM) and the contingent valuation method (CVM) (Song, Park & Yang, 2015). Among these methods, CVM estimates the value of both the use and non-use of non-market goods by surveying respondents under ideal circumstances (Bishop & Heberlein, 1979; Carson & Mitchell, 1993; Hanemann, 1989; Loomis, 1988; Mackenzie, 1993; Lee & Han, 2002; Lee et al., 2009; Kim et al., 2012; Mjelde et al., 2012). Because dichotomous choice (DC) methods can cause hypothetical bias when used with CVM (Lee & Mjelde, 2007; Han & Lee, 2008; Mjelde et al., 2012), double-bounded dichotomous choice (DBDC) is preferred as an alternative method for estimation (Carson, 1995).

This study focuses on the Saryeoni forest path,

a major natural tourism resource in Jeju, South Korea and estimates tourists' WTP and the forest's non-market value. The findings are an important prerequisite for changing the admission policy to fee-based management in order to promote sustainability and conservation. To this end, DBDC-type for WTP was used.

II. Literature Review

A. Contingent Valuation Method

CVM is a tool for evaluating the economic value of nonmarket goods, particularly tourism resources. This approach to valuing public goods utilizes hypothetical scenarios to elicit WTP through surveys (Freeman, 1993). Through this method, the estimation of the economic value, including both the use and preservation values, of the resource is possible (Carson & Mitchell, 1993; Lee & Han, 2002), which is important in a wide range of research areas including valuation studies of highly-public tourism resources (Hadker et al., 1997; Nomura & Akai, 2004).

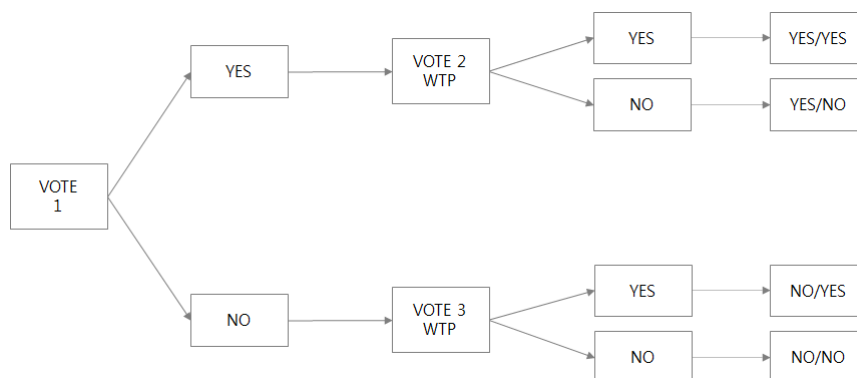
To elicit WTP using CVM, researchers can use two types of questionnaires: open-end and closed-ended surveys. Open-ended surveys mainly use direct question and payment card format. The specific CVM method is shown in Table 1. While the former asks respondents to state their own WTP the latter state their own WTP based on their payment card (Mitchell & Carson, 1981). However, direct surveys can reduce starting bias, respondents cannot evaluate the economic value of Saryeoni forest path and can lead to strategic bias to avoid big or small WTP intentionally (Mitchell & Carson, 1989).

By contrast, closed-ended questionnaires, especially DC surveys, can address this problem by providing the respondent only two options: whether or not to pay a randomly selected amount of money (Bishop & Heberlein, 1979). Randomly varying the proffered price across respondents reduces starting point bias, a key concern in CVM, and it can minimize strategic bias (Freeman, 1993). Considering the advantages

Table 1. Question type using CVM

Category	Questionnaire type	Characteristic
Open-ended question	Open-ended question on choosing amount of payment	“No answer” or “unwillingness to answer” could occur
Bidding game	Repeated question to reach WTP of respondents by raising suggested payments when first suggested WTP is “Yes”	First suggested price could be influential. Postal questionnaire is not possible
Payment card	Suggest price and choose them Ex) ①KRW 1,000②KRW 2,000 ③KRW 3,000	“No answer” could be minimized, but the suggested price could influence the response
Dichotomous choices	Prices suggested and “Yes” or “No” choice provided. Statistically estimate WTP in relation between “Yes” and suggested prices	Respondents can provide a reliable answer easily, but require various samples. Respondents can avoid answer if the price is much higher than the respondent’s WTP.
Double-bounded dichotomous choice	DBDC questions are suggested twice	Efficiently acquire more information from the same sample. Repeated questionnaires can induce real WTP just like a bidding game. However, respondents could not answer correctly.

Source: Re-adjusted sources from Kwon & Lee (2018).

**Figure 1.** DBDC method utilizing multiple choice

Source: Azlina et al. (2018). Willingness to Pay for Renewable Energy: Evidence from Malaysian's Households. P. 147.

of dichotomous choice method, closed-ended DC is preferred since mid-1880s (Boyle & Bishop, 1988; Hanemann, 1994; Han & Lee, 2008; Lee et al., 2009).

With all the merits of this DC-type CVM, however, there is a possibility that hypothetical bias can occur leading to the overestimation of WTP for respondents is overestimated (Lee & Mjelde, 2007; Han & Lee, 2008; Mjelde et al., 2012). To overcome the issues, Hanemann (1984) and Carson (1995) suggested double-bounded dichotomous choice. This method suggests proposed price again based on the responses from the first proposed price to document the data (Alberini

& Cooper, 2000; Fix, 2002).

If respondents choose “Yes” on the first suggested price, DBDC suggests a higher price, (generally twice the price) If respondents choose “No”, the price is lowered (generally by 1/2). DBDC generates four possible results (Yes-Yes, Yes-No, No-Yes, No-No). Additional WTP range information is deduced in this process, such as that statistical efficiency is higher than SBDC. A detailed diagram is shown in Figure 1. This study, therefore, seeks to uses DBDC since it can enhance the efficiency of data in comparison with the DC method and correct wrongly proposed

payment amounts.

B. Trends in CVM studies and review of affecting variables

In the 1970s, CVM studies mainly focused on environmental resources; but, nowadays, CVM is applied to a wider range of goods, including cultural resources, sports events, tourism resources, etc. Traditionally, CVM studies focused on the utilization value of ecotourism resources and natural tourism resources. Bateman & Langford (1997) estimated the non-use value of Norfolk Broads National Park in the UK for conserving wetlands using open-ended questionnaires. As part of a study of natural assets, Hadker et al. (1997) assessed the value of the Borivali National Park in Mumbai, India using open-ended and DBDC methods. Lee & Han (2002) estimated the value of national parks using DC methods. Leon (1996) and White & Lovett (1999) each focused their studies area on national parks. Lee & Mjelde (2007) and Mjelde et al. (2017) carried out studies on the valuation of the DMZ Peace Park in South Korea. Other previous studies include a case on the conservation value of the endangered species ‘Asiatic black bear’ (Han & Lee, 2008) and DBDB studies estimating the value of local festivals (Jung & Lee, 2014; Boo, 2019).

Table 2 shows the influential variables that affect

CVM. Prior CVM research, identifies the following variables as important predictors of WTP: proposed price, demographic features (gender, income, age, and education level), environmental attitude, pull factors, and satisfaction (Han & Lee, 2008; Lee et al., 2009; Lee & Han, 2002; Lee & Mjelde, 2007; Mjelde et al., 2012; Jung et al., 2009; Lee, 2013). In a study of the valuation of Minjoojisan Mountain in Youngdong, Korea, Lee & Han (2002) found gender, proposed payment, level of education, and pull factors to be key variables explaining WTP. Studying the DMZ Peace Park, Lee & Mjelde (2007) showed that proposed price, familiarity with the DMZ, development impact, environmental attitude shape WTP. Lee et al. (2009) found that proposed price, age, income, and bird-watching experience shaped respondents’ valuation of bird-watching tourism. A study on Asiatic black bear on Jirisan Mountain in Gyeongnam, Korea (Han & Lee, 2008) showed proposed price, age, income, and environmental attitude to be important predictors. A study by Lee et al. (2008) on horticulture therapy revealed that proposed price and income were influencing variables. Monthly income, age, approval rating were recognized as key variables in Lee’s (2013) study on the conservation value of Dokdo Islet, while a study on festivals by Jung & Lee (2014) found that only living area impacts WTP. By contrast, Boo (2019) found that age and income had a significant impact on the WTP of

Table 2. Influential variables on CVM

Authors	Influential variables
Lee & Han(2002), Han & Lee (2008), Lee & Mjelde (2007), Lee et al. (2009), Jung et al. (2009), Mjelde et al. (2012), Lee (2013)	Suggested price, gender, income, age, education level, environmental attitude, pull factor, satisfaction
Lee & Han (2002)	Gender, suggested price, education level, pull factor
Lee & Mjelde (2007)	Suggested price, Familiarization on DMZ, development impact, environmental attitude
Lee et al. (2009)	Suggested price, age, income, birdwatching experience
Han & Lee (2008)	Suggested price, age, income, environmental attitude
Lee et al. (2008)	Suggested price, income
Lee (2013)	Monthly income, age, support level
Jung & Lee (2014)	Residence
Boo (2019)	Age, income

tourists. Across CVM research, demographic variables seemed to be important, but the significance levels of these variables were inconsistent from study to study. In summary, while a number of variables affect WTP, the common finding across these studies was that proposed price was the key variable shaping WTP.

Table 3 shows the results of CVM-related studies on forests. Lockwood & Tracy (1995) adopted a tobit model to estimate the WTP by utilizing an open-ended questionnaire and Machado (2000) employed the dichotomous choice CVM to estimate the usable value of an eco-park.

Lee & Han (2002) utilized a single-bound method to estimate usable area and the conservation value of five national parks in Korea. It stated that close city areas lead to conservation value and remote areas lead to recreational value.

Kim & Byun (2003) analyzed the WTP of Bukhansan National Park using payment card type based on tobit model and dichotomous choice based on probit model. The results showed that payment card method is priced at KRW 5,409 and dichotomous choice is KRW 2,682.3. Kim et al. (2014) employed 1.5 dichotomous choice CVMs to estimate the value of the healing forest of Jangseong in Korea, which is becoming increasingly popular to visit. The analysis showed that WTP mean of 1 time fee per person to the forest is priced at KRW 35,010 and annual usable price is estimated to be KRW 7.5 billion. Kang (2011) estimated the recreational value of 6 forests in North Chungcheong province, Korea. The

value is estimated to be between KRW 14,000 and KRW 16,500. The recreational value of each forest is valued at approximately KRW 1.2 billion to 1.3 billion. Tao et al. (2012) conducted studies on the WTP for restoration and conservation of forests to estimate the economic value of the forest ecosystem service. Studies of Ariyo et al. (2018) utilized a single-bound method and showed that villagers' WTP is significantly influenced by gender, education level, occupation, income, etc.

III . Methods

A. Setting up study model

The CVM employed in this study models visitors' WTP as an argument in a utility function, which can then be used to generate the probability that the respondent will choose to visit the path (Hanemann, 1984). The model was specified based on previous research (Lee & Cho, 2004; Jung & Lee, 2014; Boo, 2019). Visitors to the Saryeoni forest path maximize their utility. When an admission fee, p , is levied on the Saryeoni forest path, which is currently free of charge, visitors are faced with whether or not to pay the fee to visit the forest.

At this point, it is assumed that the utility function of an average visitor takes the form $v(\cdot)$, as shown in equation(1) below. This function follows the form of the general utility functions in economics.

Table 3. Contingent valuation studies of forest conservation

Author	Evaluation target	Evaluation method	Estimation model	Payment method
Lockwood & Tracy (1995)	City park	Open-ended	Tobit	Fund
Machado (2000)	Eco-park	Single-Bound	Logit	Admission fee
Lee & Han (2002)	National park	Single-Bound	Logit	Admission fee/Tax
Kim & Byun (2003)	National park	Payment Card Single-Bound	Tobit, Probit	Admission fee
Kang (2011)	Recreational forest	Double-Bound	Logit	Fund
Tao et al. (2012)	Forest ecosystem	Single-Bound	Logit	Fund
Kim et al. (2014)	Healing forest	one-and one-half Bound	Linear	Fee
Ariyo et al. (2018)	Forest ecosystem	Single-Bound	Logit	Fund

$$v_i(w_i, d_i, k_i, I_i) + \epsilon_i \quad (1)$$

In equation (1), w_i is the income of the visitor, i , and d_i is a vector of the demographic characteristics of the visitor. k_i is a vector of variables representing the characteristics of tourism. I_i takes a value of 1 if the tourist chooses to pay the admission fee, p , and visit the Saryeoni forest path. This variable takes a value of 0 if the tourist does not pay the fee and visit the forest. ϵ_i represents the error term.

If visitors decide to visit the Saryeoni forest, the utility of visiting the forest by paying the appropriate admission fee (case 1) should be the same or higher than the utility of not visiting the forest (case 0). Equation (2) captures this mathematically.

$$v_{1,i}(w_i - p, d_i, k_i, 1) + \epsilon_{1,i} \geq v_{0,i}(w_i, d_i, k_i, 0) + \epsilon_{0,i} \quad (2)$$

As shown in equation (2), the expense, p , must be exceeded by the tourists' WTP in order for a visit to the Saryeoni forest path to be chosen. If this utility equation can be assumed to be linear, the probability to visit the forest can be shown as equation (3) below.

$$\begin{aligned} P[\Delta v_i = v_{1,i}(w_i - p, d_i, k_i, 1) + \epsilon_{1,i} - \{v_{0,i}(w_i, d_i, k_i, 0) + \epsilon_{0,i}\} > 0] \\ = P[\{\alpha_1 + \beta_1(w_i - p) + \gamma_1 s_i + \delta_1 k_i + \epsilon_{1,i}\} \\ - \{\alpha_0 + \beta_0(w_i - p) + \gamma_0 s_i + \delta_0 k_i + \epsilon_{0,i}\} > 0] \\ = P[-\{\alpha + \beta(w_i - p) + \gamma d_i + \delta k_i\} < \epsilon_i] = F_e(\Delta v_i) \\ , \alpha = \alpha_1 - \alpha_0, \beta = \beta_1 - \beta_0, \gamma = \gamma_1 - \gamma_0, \delta = \delta_1 - \delta_0, \epsilon_i = \epsilon_{1,i} - \epsilon_{0,i} \end{aligned}$$

Assuming a logistic distribution where the probability of the error terms is $\epsilon_i \sim \text{logistic}(0,1)$, equation (3) can be estimated as logit model shown in equation (4).

$$\begin{aligned} Pr(\epsilon_i < \alpha + \gamma d_i + \delta k_i + \beta w_i - \beta p_i) \\ = (1 + \exp(-(\alpha + \gamma d_i + \delta k_i + \beta w_i - \beta p_i)))^{-1} \end{aligned}$$

Considering this, the study uses as demographic and control variables gender, age, visit experience, education level, visitor composition, income level, and visiting purpose in addition to payment (admission fee).

B. Study method

The purpose of this study is to estimate the economic value of the Saryeoni forest path utilizing CVM method. An on-site survey was conducted of visitors to the path. At the time of the survey, the Saryeoni forest paths were accessible on a free-admission basis, so visitors were asked what they would be willing to pay as an admission fee, taking into account the conservation value of the forest in addition to their own enjoyment. Preliminary survey and main survey was conducted. The estimation method of CVM employed in this study has starting bias and accurate selection of first proposed amounts is important to avoid the bias. To eliminate starting bias, preliminary studies suggested DBDC method as a basis for estimating first proposed payment amounts by primarily estimating average WTP from respondents using open-ended questionnaire (Herriges & Shogren, 1996). This study determined the payments for visiting Saryeoni forest path as an admission fee and conducted preliminary survey of the visitors in determining the first proposed payment amounts using open-ended method. The survey result showed that the WTP excluding maximum and minimum prices was KRW 3,500. Based on this information, four price ranges were created (KRW 2,000 to KRW 5,000). Taking into this account, the survey estimated the public value of the forest path based on random utility theory by randomly suggesting prices to the visitors for collecting responses. To this end, Double Bound Dichotomous Choice was used. The close-ended survey was conducted over two weeks from May 25, 2019, to June 9, 2019, for visitors to the Saryeoni forest path on Jeju Island.

The respondents were asked to choose “Yes” or “No” as to whether they would willingly pay a certain admission fee as part of a change to fee-based forest management for sustainability. To provide better understanding of the survey, the information on the admission fee of related natural parks as of July 1, 2019 (Sungsan Sunrise Peak: KRW 5,000/Manjanggul Cave: KRW 4,000/Torrey Forest: KRW 3,000) included in the questionnaire.

Of the 280 questionnaires that were distributed, 236 copies were utilized in the data analysis. The remaining 44 either were missing or contained implausible answers. The data were then analyzed using SPSS 21.0 and STATA14.

IV. Results

A. Demographic characteristics of respondents

The general characteristics of the sample are shown in Table 4. In terms of gender, 39.0% (92) of the respondents were male while 61.0% (144) were female. The age distribution of the respondents was 21.2% (50) in their twenties, 20.3% (49) in their thirties, 19.9% (47) in their forties, 26.7% (63) in their 50, and 11.9% (29) in their sixties or older.

By education level, 73.3% were junior college/university graduates, 16.1% were graduate school graduates, and 10.6% were high school graduates. By occupational category, 28.8% were office/management, 17.4% were professional/technician, and 13.6% were public officials. Of those surveyed, 39.0% reported the purpose of their visit to enjoy the forests, 31.8% to relax, and 20.3% to socialize with family/friends. Of the respondents' companions, 36.0% were family and 33.5% were friends (lovers), etc. The proportion of respondents visiting for the first was 49.2% with 32.6% visiting for their second or third times.

B. Probability of WTP on the admission free of Saryeoni forest path

Table 5 shows the WTP for the proposed admission fees for the forest path. In particular, it compares

Table 4. Characteristics of Respondents

Characteristic		N(%)	Characteristic		N(%)
Gender	Male	92(39.0)	Age range	Twenties	50(21.2)
	Female	144(61.0)		Thirties	48(20.3)
Education	High school	25(10.6)		Forties	47(19.9)
	College/University	173(73.3)		Fifties	63(26.7)
	Graduate school	38(16.1)		60 and above	28(11.9)
Monthly income level	KRW 2 million or less	19(8.1)	Purpose of visit	Rest	75(31.8)
	200	45(19.1)		Friendly	48(20.3)
	300	52(22.0)		Education	21(8.9)
	400	59(25.0)		Enjoy	92(39.0)
	500	33(14.0)	Companion	Alone	21(8.9)
	KRW 6 million or more	28(11.9)		Family	85(36.0)
Position	Public officer	32(13.6)		Friend/Lover	79(33.5)
	Company employee	68(28.8)		Club	51(21.6)
	Profession	41(17.4)	Visits	First time	116(49.2)
	Agro/Fishery/Livestock	12(5.1)		2~3	77(32.6)
	Independent business	35(14.8)		4~5	21(8.9)
	Housewife	20(8.5)		More than 6	22(9.3)
	Student	22(9.3)			
Residence	Others	6(2.5)	Total	Total	236(100)
	Jeju Island	81(34.3)			
	Other	155(65.7)			
	Total	236(100)			

Table 5. Willingness to pay on bid for Saryeoni Forest Path

First proposed bid (KRW)	WTP		2 times higher (KRW)	WTP		0.5 times lower (KRW)	WTP	
	Yes Probability of Yes (%)	No, Probability of No (%)		Yes Probability of Yes (%)	No, Probability of No (%)		Yes Probability of Yes (%)	No, Probability of No (%)
2,000	45 (78.9)	12 (21.1)	4,000	12 (26.7)	33 (73.3)	2,000	10 (83.3)	2 (16.7)
3,000	43 (69.4)	19 (30.6)	6,000	4 (9.3)	39 (90.7)	3,000	8 (42.1)	11 (57.9)
4,000	18 (30.0)	42 (70.0)	8,000	1 (5.6)	17 (94.4)	4,000	33 (78.6)	9 (21.4)
5,000	17 (29.8)	40 (70.2)	10,000	3 (17.6)	14 (82.4)	5,000	30 (75.0)	10 (25.0)
Total	123 (52.1)	113 (47.9)	Sub total	20 (16.3)	103 (83.7)	Sub total	81 (71.7)	32 (28.3)

the probability of repeated questions on WTP to reduce the hypothetical bias. Overall, the higher the amount suggested as admission fee for the forest, the lower the willingness to pay. The survey result showed that 52.1%, or 123 out of 236 respondents, answered “Yes,” while 47.9%, or 113 out of 236 of respondents, answered “No.” Among the “Yes” answers, 16.3% (20) were for the rate that was twice as high as the first proposed bid and 71.7% (81) were the rate that was half the initial proposal.

C. Estimated result of Logit Model

Table 6 shows the results of the estimation result of a logit model to identify the determinants of WTP for the Saryeoni forest path. The study is analyzed based on the studies by Lee & Cho(2004), Jung & Lee (2014) and Boo (2019). As mentioned above, the model employed the visit variable as the dependent variable and experience, gender, age, education level, income level, visit program, visit purpose, and admission fee as explanatory variables. Additionally, this study considered visit characteristic variables, including who the respondent visited with (alone, family, friend/lover, or group) and the respondent’s visit purpose (leisure or non-leisure), differentiating it from previous research. This is a variable that determines the value of the amount of payment when visiting

Saryeoni forest according to the visit group and purpose. The age variable is comprised of five categories (twenties-sixties). Visit composition consists of four categories (alone, family, friend/lover, group), which are then divided into dummy variables with alone as a reference category. The other variables are either continuous or dichotomous variables.

Visit composition and purpose, the newly constructed variables in this study, are significant in determining the willingness to visit, showing which types of tourism tend to increase WTP. The log pseudo-likelihood value is -113.95 and chi-square value is 51.68, indicating that the model is sufficiently significant. Also, the pseudo R-square value is 0.315, showing that the model has sufficient explanatory power.

D. Probability of WTP on the admission free of Saryeoni forest path

The amount of proposed payment, which is the most important explanatory variable, was statistically significant at the 1% significance level. As the amount of proposed payment increases, the overall probability of WTP for entry decreases. Also, having prior visit experience leads to a lower probability of WTP, meaning the price visitors would pay for the healing value of the Saryeoni forest path and its conservation decreases gradually with repeated visits. By contrast,

earlier studies find having prior visit experience generally tends to raise the loyalty of tourists to a destination through psychological experience, increasing WTP (Lee, 2013). Therefore, this result raises questions about whether visitors will continue to visit the Saryeoni forest if fee-based admission policy is put in place.

Looking at the gender variable, males had relatively higher WTP, but this result was only significant at the 10%. By age, the WTP of visitors in their forties, fifties, and sixties and above was higher than for those in their twenties. The difference between those their fifties and those in their twenties, especially, was statistically significant and had the largest impact of any age comparison on WTP. This shows that the WTP for the healing content and conservation of Jeju becomes clearer as age increases. Additionally, the coefficient for level of education suggests higher awareness of environmental issues led to the increase

of WTP to preserve its environment. Interestingly, the respondent's income level had no significant effect.

WTP was relatively higher among those visiting with friends/lovers than among those visiting alone. Tourists who visited for relaxation were less likely to pay than tourists who visited for other purposes. It can be said that visit composition based on friends/lovers have much more WTP than the other groups in enjoying a better environment. Also, the probability of WTP is high if visit purpose is socialization, education, etc. compared with relaxation.

E. Estimation result of WTP on admission fee

Based on the estimated results of the logit model in Table 6, Table 7 shows the calculation of the WTP of the average respondent for admission to

Table 6. Results of logit model of WTP

Gender Explanatory variable	Visitors	
	B	S.E.
Bid	-0.00115***	0.00021
Visit experience	-0.49262***	0.18801
Gender (Male=1)	0.69813*	0.37159
Age		
Thirties	-0.49941	0.62218
Forties	0.80171	0.61743
Fifties	1.60821***	0.54344
Sixty and above	1.05249	0.73622
Level of education	1.54641***	0.41621
Level of income	-0.03078	0.12754
Visit group:		
Family	0.19505	0.78858
Friend (Lover)	1.72962**	0.80465
Group	0.18628	0.86373
Visit purpose (Rest=1)	-1.43300***	0.45695
Constant term	1.36560	1.13810
Log pseudolikelihood = -113.95285		
Number of obs = 240		
Wald chi2(13) = 51.68		
Pseudo R2 = 0.315		

Note: For Age, the reference category is twenties and, for Visit group, the reference category is alone.

*** significant at the 1% level

** significant at the 5% level

* significant at the 10% level

the Saryeoni forest path.

Following Hanemann (1984), the WTP mean, the WTP overall mean, and the WTP truncated mean were estimated using the mean levels of each of the explanatory variables. As shown in Table 4, the WTP mean was KRW 3,554, the WTP overall mean was KRW 3,539, and the WTP truncated mean was KRW 2,294. Most public projects create non-negative utility through the provision of public goods or services, as is the case with ecotourism like the Saryeoni forest path. Therefore, the WTP truncated mean was calculated allowing only non-negative values. According to this WTP estimate, the fee for admission to the Saryeoni forest path can be increased from zero to about KRW 2,300.

F. Result of estimated benefit

The estimated WTP for conserving the Saryeoni forest path in this study is KRW 2,294. Based on this figure, the estimation of conservation value of Saryeoni forest (consistent of the selection value, existence value, and bequest value) can be calculated using a method adopted by Song et al. (2015). The annual total WTP can be calculated by multiplying the number of visitors by the estimated per capita WTP. The number of annual WTP visitors is calculated using average attendance over the three-year period from 2016 to 2018. So, given a total of 1,371,622 people who visited during that time, the annual average was 457,207 people. The average annual economic value for this period is estimated to be KRW 1,048,832,858 as shown in Table 8.

Table 7. Estimation of Willingness to Pay

Explanatory variable	Visitors		
	Estimated coefficient (A)	Average value (B)	Square (A*B)
Bid	-0.00115		
Visit experience	-0.49262	1.77917	-0.87645
Gender (Male=1)	0.69813	0.3375	0.235619
Age:			
Thirties	-0.49941	0.20417	-0.10196
Forties	0.80171	0.19583	0.156999
Fifties	1.60821	0.26250	0.422155
Sixty and above	1.05249	0.12083	0.127172
Level of education	1.54641	2.05000	3.170141
Income	-0.03078	3.52083	-0.10837
Visit composition:			
Family	0.19505	0.36667	0.071519
Friend (Lover)	1.72962	0.33333	0.576534
Group	0.18628	0.21250	0.039585
Visit purpose (Relax=1)	-1.43300	0.70417	-1.00908
Constant terms	1.36560		1.36560
Total (a)			4.069457
b		-0.00115	
WTP mean	3553.391	$-(1/b) * \ln(1 + \exp(a))$	
WTP overall mean	3538.659	$-(a/b)$	
WTP truncated mean	2294.029	$-(1/b) * \ln((1 + \exp(a)) / (a + \exp(a + b * 5,000)))$	

Note: For Age, the reference category is the twenties, and for the Visit group, the reference category is alone.

Table 8. Estimation of valuation of Saryeoni forest path

WTP truncated mean	Year	Number of visitors	Total of annual average WTP
KRW 2,294	2016	338,226	KRW 1,048,832,858
	2017	452,848	
	2018	580,548	

Note: Data on number of visitors drawn from the records of the Department of Forest & Recreation, Jeju Special Self-Governing Province.

V. Conclusions

This study estimated the non-market value of the Saryeoni forest path, one of representative tourist destinations of the Jeju Special Self-Governing Province. The data were obtained using a DBDC survey, which is recognized as a method to minimize bias in CVM. To estimate WTP, a preliminary survey established the initial proposed payment amount of KRW 2,000 (raising it from KRW 1,000). The variables used in the analysis were the amount of payment, visit experience, gender, age, level of education, level of income, visit composition, and the visit purpose.

The findings of this study showed that WTP for access to the Saryeoni forest path is slightly higher among men, first-time visitors, those in their fifties, and those with higher levels of education. On the other hand, income level, a frequently cited determinant of WTP, had no significant effect. Visit composition and visit purpose, two variables overlooked in previous research, showed significant impacts. WTP was higher for those visiting with friends or lovers than those visiting alone, and it was lower for those visiting for relaxation than for those visiting for other purposes. This means that a majority of visitors prefer lower cost or free admission to the Saryeoni forest path. Also, this awareness supports the relative burden of paying admission fee for relaxation, not for socialization and education purposes.

Using the results to generate aggregate inferences, the estimated WTP for the average visitor to the Saryeoni forest is about KRW 2,294. The average annual economic value of the forest is calculated using the average number of visitors from 2016 to

2018 and is estimated to be KRW 1,048,832,858. Future CVM studies should consider variables such as attitude, attraction factor, and satisfaction in order to generate more accurate estimates of economic value.

This study's findings on the economic value of the Saryeoni forest path have several policy implications. First, this study will inform the implementation of an optimal fee-based admission policy for the Saryeoni forest path to enhance its conservation and economic sustainability. Second, while the free admission system encourages repeated visits by tourists, regression results indicated lower WTP among returning visitors. Therefore, it is necessary to design an admission policy that balances fee collection to cover services and conservation with accessibility to the forest for those seeking relaxation. Third, it is imperative to provide local expert training programs, appropriate guide service, and systematic promotion to establish the Saryeoni forest path as an eco-friendly tourist attraction. Lastly, the valuation of the Saryeoni forest path will provide an opportunity to visitors to raise awareness on the importance of the preservation and management of the forest.

There are, however, some limitations to this study that should be noted. First, the results of CVM study such as this one can vary depending on the characteristics of the hypothetical scenario, types of payment, and respondents. Given this uncertainty around the annual value estimate KRW 1,048,832,858 from this study, further research should expand samples to measure the non-market value of the forest path more accurately. Second, while this study is the first paper to evaluate the economic value of Saryeoni forest path to domestic visitors, future should also compare WTP between domestic and international

visitors. Third, as shown in studies by Lee & Cho (2004), Jung & Lee (2014), Boo (2019), this study employed a dichotomous choice method. However, an ordinal categorical response variable should be applied to future studies. Comparison and analysis of the differences between ordinal categorical response variable and dichotomous choice method should be completed.

Lastly, it is unknown whether respondents were clearly aware of the fee-based admission system when they answered the questionnaire. Therefore, further study is needed to ensure that respondents have a clear understanding of the hypotheticals offered to them.

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