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The Total Economic Value of Sport Tourism in Belt and Road Development—An Environmental Perspective

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Abstract: The development of the belt and road region leads cities to significantly increase the amount of public expenditure on the new construction of facilities and infrastructure. Mass construction not only relies on many environmental resources, but might also destroy the local natural environment. In order to reveal the importance of the natural environment, this study explores the economic value of the natural landscape for sport tourism in Taiwan. While the concept of total economic value (TEV) is applied to the Sun–Moon Lake Swimming Carnival Event, the travel cost method (TCM) is adopted to estimate the use value for participants, and the double-bounded dichotomous contingent valuation method (CVM) and survival analysis are performed to evaluate the non-use value for the residents. The use value is on average NT$ 5668 for one participant. The median willingness to pay for the option value, existence value and bequest value of every resident is NT$433, NT$411 and NT$274, respectively.

Keywords: sport tourism; total economic value; travel cost method; contingent valuation method

1. Introduction

The Belt and Road development project is being carried out in joined countries to enhance complementarities and development synergies and to promote the common progress of the participating countries through closer international cooperation. The project emphasizes economic growth, job creation, poverty reduction and environmental protection, leading people to a better quality of life. When the cooperators plan to build numerous infrastructures in these countries, the protection of the natural environment is needed, because the natural environment provides ecosystem services and goods for people.

Sun–Moon Lake is one of the most famous natural tourist attractions in central Taiwan and the Swimming Carnival Event has been hosted annually in Sun–Moon Lake since 1983. This event was certified as the biggest swimming activity by the International Olympic Committee in 1995 and was listed in the International Swimming Hall of Fame Headlines in 2002. The number of participants has increased from over 10,000 in 1996 to 27,000 in 2016. A sport event is one kind of tourism product and generates an image for the destination to attract sport tourists to visit the event [1]. Both the landscape of natural resources or the sporting event possess the characteristics of a public good. The Swimming Carnival Event across Sun–Moon Lake provides externalities for economic effects.

The swimming event uses nature resources that can be categorized as the natural landscape in sport tourism [2]. The value of the natural environment is important for cost/benefit analyses for the Belt and Road project, which cannot be assessed by using market prices directly. It can instead be estimated by non-market methods. The main purpose of this study is to try to construct a conceptional framework of the total economic value (TEV) for the Sun–Moon Lake Swimming Carnival Event in Taiwan. The total economic value of sport tourism needs not only to consider the use value of the sport event itself, but also to consider the non-use value of the environment. The following section of this paper includes a literature review of TEV and sport tourism. Section 3 introduces the materials and methods for calculating the TEV and Section 4 shows the results and discussion of the TEV estimation. Finally, the conclusion discusses the main TEV results for the Sun–Moon Lake Swimming Carnival Event.

2. Literature Review

2.1. Sport Tourism and Legacy

Mega events bring benefits and costs in terms of economic, social and environmental impacts [3]. Sports events are always associated with an increase of tourists to a host city [4]. The new and rebuilt infrastructure attracts domestic and international tourists to the hosting city [5–10], and so do the small-scale sporting events [11]. The smaller recurring sport events such as local marathons and cycling tours may produce a more sustainable economic impact [12]. Thus, sport events are also an important tool for tourism development in a host community [1]. The development of sports tourism is becoming the most popular leisure experience in the world over the last two decades [12,13]. Standevan and Deknop (1999) defined sport tourism as follows [14]:

> *All forms of active and passive involvement in sporting activity, participated in casually or in an organized way for non-commercial or business/commercial reasons that necessitate travel away from home and work locality.*

Furthermore, Gammon and Robinson (2003) determined that a criteria for sport tourism is that sport is a prime purpose for travel. They categorized sport tourism into a hard and soft definition. For hard sport tourism, a sport tourist is active or passive in participating in a competitive sporting event, while soft sport tourism refers to tourists who are primarily involved in recreational sporting or leisure activities [15]. Kurtzman (2005) defined sport tourism as individuals who use physical activity sports as a vehicle for tourism endeavors [16]. The Sun–Moon Lake Swimming Carnival Event is a recreational activity for swimmers, so this event belongs to soft sport tourism and is combined with natural landscape trips. Soft sport tourism generates relatively high benefits for a host city [17], since tourism activities may increase long-term economic growth in the host city [4].

With the accelerating improvement of sports facilities, hosting mega sports events can also contribute to generating tourism product legacies. However, a precise definition of legacy is still elusive [18]. Chapplete and Junod (2006) demonstrated that after hosting a sport event, the host city or region was left with tangible and intangible material to generate positive or negative impacts on the host region in an objectively and subjectively direct or indirect way, called the legacy of sport [19]. Furthermore, Preuss (2007) has developed a definition of legacy as follows [20]:

> *Irrespective of the time of production and space, legacy is all planned and unplanned, positive and negative, tangible and intangible structures created for and by a sport event that remain longer than the event itself.*

At the same time, Barget and Gouguet (2007) performed TEV to estimate the use and nonuse value of sport. He replaced bequest value with legacy value and defined legacy value as follows [21]:

> *This is the satisfaction felt as a result of handing down a sporting event to future generations. It mainly measures all the value that could be given to sporting culture as a heritage for mankind (one talks now of a global public good).*

Preuss (2015) criticized the definition of Barget and Gouguet (2007), arguing that it only focused on positive effects for future generations. He provided a supplementary description that argues that the legacy should be seen as structural changes that affect the city's location factors and trigger new impacts. The concept of legacy is different from 'leveraging', 'sustainability', and 'impacts'. Preuss (2015) added six elements to the original description of legacy, including time, new initiatives, positive and negative values, tangible or intangible, space, and indirect or unintentional dimensions [22]. However, Preuss' definition of legacy (2007, 2015) seems to contain everything relative to sport events, which encompasses an unlimited domain.

Both host and non-host residents considered the environmental legacy to be the most important of the Olympic Games [5]. Hosting mega sport events might negatively affect a cities' natural environment because building the venues and infrastructure and the operation of the events involves huge environmental resources, activities, and construction projects [23]. In order to reduce potential conflicts between the games and the natural environment, the International Olympic Committee (IOC) has added an environmental component into the Olympic movement as the third pillar along with sport and culture in 1996 [24]. The evolution of the Olympic Games has transferred from competition and economics to the environment and sustainable development. Therefore, this study tries to introduce the concept of environmental estimation into sport events.

2.2. Total Economic Value

TEV is the most commonly used model for estimating ecosystem services value. The TEV framework, established by Randall and Stoll (1983) [25], can be classified as use value and non-use value [26,27]. Boyd and Banzhaf (2007) interpreted the direct use value of ecosystem services as the consumers using the resources directly and transferring the process as a welfare utility to them [28]. The carnival event participants interact with Sun–Moon Lake directly and contribute to recreational benefits.

Environmental economists evaluated the non-use value caused by the Exxon Valdez oil spilt in the Gulf of Alaska. Larson (1992) introduced non-use value to cost/benefit analysis [29]. Non-use value includes option, request and existence values. Option value is the value that consumers are able to purchase environmental goods or services in the future [30]. Existence value is the value that individuals are able to pay for existing environmental resources, and bequest value represents the value that individuals are willing to pay for the preservation of natural resources for future generations [31–33]. However, the option value includes users and nonusers, which depends on their decision whether or not to use it in the future. Huang and Wang (2015) and Plottu and Plottu (2007) separated option value as an independent value along with use value and non-use value [34,35].

In sports research, Barget and Gouguet (2007) and Owen (2006) also classified TEV into two main categories: use value and nonuse value [21,36]. The subcategory of use value and nonuse value in Owen (2006) was the same as in Bateman and Langford (1997) and Freeman (1993) [26,27,36], though Barget and Gouguet (2007) replaced bequest value with legacy value. For both users and non-users, bequest value indicated the value that environmental resources are left to future generations [26]. From the environmental perspective, sustainable development and the inclusion of non-users are heavily emphasized, which is different from legacy value for latent use.

With option value, individuals may or may not choose to use the swimming event as an economic value in the future. If their options are to attend the swimming event, the option value is the same as the legacy value. If they will not join the event, the option value equals to non-use value. For these reasons, this study divides option value into use value and non-use value. The framework leads to a better estimation of the TEV for the Swimming Carnival Event on Sun–Moon Lake (see Figure 1).

The host community builds atmospheric elements in the city or region to increase subjective well-being for residents [37]. Local residents evaluate the effectiveness of sports events subjectively to achieve successful and sustainable sport events [3,38]. Deccio and Baloglu (2002) considered that mega events would stimulate the protection of the natural environment for the hosting of sport events in the local landscape. However, the non-use value of a sport event is normally neglected by sports economists, especially the connection with residents [3]. The success of an event requires the support of the residents [6]. Thus, this study tries to explore the option value and non-use value of sport events for residents.

3. Materials and Methods

The Swimming Carnival Event of Sun–Moon Lake is near to a public good. Not only the landscape of natural resources, but also the sporting event provides externalities for economic effects. This study revises the TEV framework from Huang and Wang's (2015) model (Figure 1) [16]. Based on the environmental conception, this study is focused on the Swimming Carnival Event and the natural environment of the host site. Since the option value is valued for individuals in future choice, that is a static non-use condition during the event period. Thus, this study only estimates non-use for the option value. Legacy results from changes to a host city's structures, and may only be felt long after the event [22], and should therefore be evaluated for at least 20 years after the event [4]. However, the Swimming Carnival Event of Sun–Moon Lake recurs annually. The bequest value is generally used to describe the change in an environmental parameter that results from the swimming event at Sun–Moon Lake, which is consistent with the TEV framework. Participants join the event and use the natural resources directly. The recreational benefits are use value that can be estimated by travel cost method (TCM). The non-use value of the swimming carnival depends on the local community that can be estimated by contingent valuation method (CVM). Local residents evaluate the sports event to achieve successful and sustainable sport events. Barget and Gouguet (2007) also used TCM and CVM to evaluate the use value and nonuse value [21]. Therefore, this study adopts TCM and CVM to evaluate the use value for participants and non-use-value for residents of the swimming event, respectively.

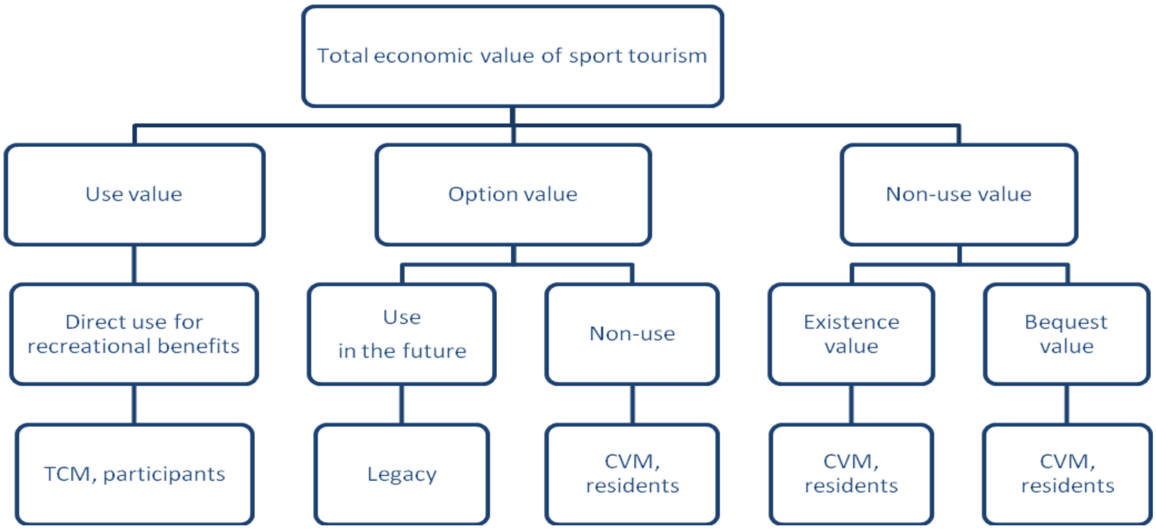

Figure 1. Total economic value of sport tourism.

3.1. Travel Cost Method

TCM is based on the demand rule of economics theory. From the demand curve, the number of trips of a participant is a proxy for demand quantity and the travel cost is a proxy for price. The recreational benefits for participants can be calculated by the consumer surplus from the demand function. Loomis et al. (2009) estimated the annual recreational benefits of Colorado golfers by TCM, the sum of consumer surplus was $143.8 million [39]. Wicker et al. (2017) used TCM to evaluate spectators attending German football, the consumer surplus of per game trip was €345 [40]. Jones, Yang, and Yamamoto (2017) also adopted TCM to calculate the climber demand for Mount Fuji from 2008 to 2013 [41].

The quantity of the demand function was the swimmers who participated in the Swimming Carnival Event of Sun–Moon Lake. The independent variables of the demand function were travel cost, substitute destination travel cost and socioeconomics. The own price was travel cost, including the transportation fee, on-site expenditure and opportunity cost of time. While the transportation fee counts the round trip from home to the destination site, so does the substitute travel cost [42,43]. The travel time of the round trip spent at the destination site could be counted as one-third of the wage rate. Excluding the opportunity cost underestimates the travel cost and recreational benefits [44]. The estimation function overestimates the recreational benefits of omitting the variable of substitute site cost [45].

In the empirical model, an on-site Poisson model was performed to estimate the consumer surplus of individuals who participated in the Swimming Carnival Event. Shaw (1988) derived the on-site Poisson function from Poisson distribution, $\Pr(x_i) = \frac{e^{-\mu_i}\mu_i^n}{x!}$, $n = 1, 2, \ldots$, where $\mu_i = \exp(z_i\beta)$, μ_i is the mean and equal to the variance, z_i is an independent variable, and β is a parameter of the exponential function [46]. The on-site Poisson corrects truncated and endogenous stratification, and the log-likelihood function can be expressed as follows [34]:

$$\ln L = \sum_{i=1}^{T}\left[z_i\beta(x_i - 1) - e^{z_i\beta} - \ln[(x_i - 1)!]\right] \quad (1)$$

The recreational benefits for participants can be estimated using the consumer surplus (*CS*) [34,47]:

$$CS = \int_{p_o{}^0}^{p^c} x(\cdot)dC = \left[\frac{e^{\beta_0+\beta_1 C}}{\beta_1}\right]_{C=C^0}^{C\to\infty} = -\frac{x}{\beta_1} \quad (2)$$

here, C is own price and β_1 is the coefficient of C. The expected sign of β_1 is negative, which implies a negative relationship between total travel cost and number of trips.

3.2. Contingent Valuation Method

Contingent valuation method is a stated preference method to evaluate respondents' willingness to pay (WTP) under different hypothetical scenarios [48]. Wicker et al. (2012) used CVM to estimate the WTP of Germany being ranked first in the medal table and for a German winning a gold medal in track and field at the 2012 London Olympics, the results were €6.13 and €5.21, respectively [49]. Wicker et al. (2017) also estimated the WTP for German residents supporting the hosting of the 2024 Summer Games in Hamburg, the aggregation over a five-year period amounted to €46 billion [50].

The CVM questionnaire can be classified as an open-ended and closed-ended format. The errors resulting from the closed-ended format are fewer than from the open-ended format [51]. The closed-ended format usually has two methods, single-bounded and double-bounded. The double-bounded format obtains more information than the single-bounded format [52], and the results demonstrate that the double-bounded format is better than the single-bounded format [53] The double-bounded dichotomous choice model produces the interval-censored data for WTP estimation, which meets the survival analysis [54,55], and the different survival functions improve the goodness-of-fit for parameter estimation [56]. Thus, this study used CVM with double-bounded dichotomous choice and a survival function to assess non-use value. The double-bounded dichotomous choice model asked respondents twice for the bid price. Let M_1 and M_2 represent the first bid price and the second bid price, respectively. I_i denotes whether respondents accept or do not accept the price, and i = 1, 2, where $I = 1$ represents bid price accepted and $I = 0$ represents bid price not accepted. The log likelihood of the double-bounded dichotomous choice model for the survival function can be expressed as [34]:

$$\begin{aligned}\log L = & \sum I_1(1-I_2)\log\left[F\left(\tfrac{M_2-\alpha}{\sigma}\right)-F\left(\tfrac{M_1-\alpha}{\sigma}\right)\right]+I^2(1-I_1)\log\left[F\left(\tfrac{M_1-\alpha}{\sigma}\right)-F\left(\tfrac{M_2-\alpha}{\sigma}\right)\right] \\ & +I_1I_2\log\left[1-F\left(\tfrac{M_2-\alpha}{\sigma}\right)\right]+(1-I_1)(1-I_2)\log\left[F\left(\tfrac{M_2-\alpha)}{\sigma}\right]\end{aligned} \quad (3)$$

3.3. Data and Variables

This study trained interviewers to carry out a face-to-face survey. The direct value data on the recreational benefits were collected from Yeh et al. (2016) [57]. The survey was performed on 16 September, 2012. A total of 500 random participants were asked to fill in the questionnaire, 464 completed it. The non-use value was estimated by the residents living on Sun–Moon Lake, Yuchih Downtown, in Nantou County. The neighborhood of Sun–Moon Lake includes five main villages (Dalin, Jhongming, Rihyue, Shueishe, and Toushe). There are 5750 households and 16,823 residents in Yuchih Downtown. A total of 500 households were selected as the sample; the quota for each village was 100. A total of 500 residents were approached face-to-face during September and 461 residents completed the questionnaire.

The dependent variable was the frequencies joined by participants to Swimming Carnival Event. The independent variables included travel cost, substitute travel cost to the substitute site (Pingtung Kentin), participants' monthly income, education, gender, and marital status, which are listed in Table 1.

Table 1. Variable definitions and descriptive statistics.

Variable	Definition	Mean	S.D.
TRIPS	Number of observed trips for individuals participating in the swimming carnival event	2.68	2.94
COST	Total round-trip travel costs for swimming across Sun–Moon Lake (NT dollars)	1020	441.46
SCOST	Total round-trip travel costs to the substitute site, Pingtung Kentin	1810	580.90
GENDER	Male, 1; female, 0	0.80	0.40
MARITAL	Marital status of visitor: married, 1; otherwise, 0	0.52	0.50
EDU	Education years of participant	15.13	2.94
LINCOME	Log of monthly income	10.59	0.50

4. Results and Discussion

4.1. Use Value

First, the TCM model passes the goodness-of-fit test, the result shows that the Chi-square is larger than the critical value at 1%, significantly. Table 2 lists the results of the TCM estimation. The coefficient of the travel cost is negative and significant at the 0.01 level, while the coefficient of the substitute cost is positive, but is insignificant. In accordance with the demand rule, the signs are correct. A participant who spent a greater travel cost had a lower intention to join the swimming carnival event. All socioeconomic variables significantly influence the dependent variable. The education and monthly income of participants had a negative influence on the event, meaning that the swimmers who were more highly educated and with a higher income were less likely to participate the event. The variables of gender and marital status were positive to the event, revealing that male, married swimmers were more likely to participate the swimming event.

Next, the recreational benefit for participants was estimated using Equation (2). The consumer surplus was calculated with the mean of respondents joined to the event (2.68) divided by the travel cost coefficient, equal to NT$6695. Based on 25,000 participants in 2012, the total recreational benefits of the swimming carnival event were approximately NT$167.375 million. The recreational benefits are intangible, and sport managers always neglect these in cost/benefit analyses, leading to an underestimation of the benefits. The empirical result can offer more information for the cost/benefit analysis.

Table 2. Parameter estimates for the travel cost model.

Variable	Coefficient	*t* Value
Constant	2.9152	(3.563) ***
COST	−0.0004 ※	(−4.741) ***
SCOST	0.0001	(1.274)
GENDER	0.5580	(5.256) ***
MARITAL	0.7085	(8.162) ***
EDU	−0.0912	(−7.472) ***
LINCOME	−0.1642	(−1.855) *
Log likelihood function	−1.034	
Chi-squared	245 ***	

Log-likelihood ratio = (−2) × (Restricted Log-likelihood − Log-likelihood), with $\chi^2(6, 0.95) = 16.81$. *** $p < 0.01$, * $p < 0.1$, and *t* values are in parentheses. ※ 3 the actual estimated value is 0.00040028.

4.2. Non-Use Values

This study obtained the likely bid range in a pre-test with open-ended questions to avoid starting point bias for CVM with the double-bounded dichotomous choice model. The top five initial price sets for the option value were NT$100, 200, 300, 500, and 600, for the bequest value this was NT$100, 200, 300, 400, and 500 and for the existence value this was NT$100, 150, 200, 500, and 600. Respondents were asked to assess his or her first bid from the pre-chosen price set. The follow-up bid was then adjusted based on the respondent's first time answers, and then the respondent was asked a follow-up question. If the answer to the first closed-ended question was "yes", the price doubled. If the answer to the first question was "no", the price halved.

This study follows the conclusions of Stacy (1962) and obtains a family of distributions from the generalized Gamma distribution density function, which is defined as [58]:

$$f(E) = \frac{\eta r (\lambda E)^{rk-1} \exp\left[-(\eta E)^{r}\right]}{\Gamma(k)} \tag{4}$$

where $\eta = \exp(-\alpha)$ denotes the location parameter, $r = 1/\sigma$ represents the scale parameter, $k = 1/\delta^2$ is the shape parameter, and Γ denotes a Gamma function. The alternative survival functions include exponential distribution (when $r = k = 1$ or $\sigma = \delta = 1$), Weibull distribution (if $k = 1$ or $\delta = 1$), and lognormal distribution (k or δ tends to infinity).

The estimation function of the non-use value performed lognormal, Weibull, exponential, and Gamma distributions simultaneously (see Appendix A Tables A1–A3). In accordance to the model goodness-of-fit test, the Weibull distribution was significant for all non-use value models at the 1% level. The lognormal distribution was also significant for the bequest value estimation at the 1% level. For the sake of consistency, Weibull distribution was selected to assess the WTP of the non-use value (see Table 3).

The independent variables include education, monthly income, the number of years residents have lived in their village, and a dummy variable for the villages. *VILLAGE1* (value of 1 if a resident lives in Dalin; otherwise 0), *VILLAGE2* (value of 1 if a resident lives in Jhongming; otherwise 0), *VILLAGE3* (value of 1 if a resident lives in Rihyue; otherwise 0), and *VILLAGE4* (value of 1 if a resident lives in Shueishe; otherwise 0).

In general, the residents' years of education were positive and significant for the WTP for all non-use value models, including option, bequest, and existence values. The higher the resident's education, the higher the WTP that they intend to pay. In advance, the WTP of the option and existence values are also influenced by residence, as residents living in Rihyue village clearly had a higher WTP than the other areas. Resident's living time in the area also had a positive and significant impact on the WTP of the existence value. The income variable only impacted the bequest value model.

Table 3. Survival valuation functions to estimate residents' willingness-to-pay.

Variable Name	Option Value	Bequest Value	Existence Value
Constant	4.74 (6.46)	3.61 (4.59)	4.93 (7.02)
EDU	0.05 (3.39) ***	0.07 (4.31) ***	0.06 (4.00) ***
LINCOME	0.08 (1.01)	0.12 (1.50) *	0.04 (0.53)
VILLAGE 1	0.08 (0.37)	0.13 (0.61)	−0.09 (0.45)
VILLAGE 2	0.04 (0.23)	−0.23 (1.16)	0.08 (0.47)
VILLAGE 3	0.36 (2.21) **	0.19 (1.16)	0.22 (1.51) *
VILLAGE 4	0.04 (0.29)	0.12 (0.79)	−0.02 (0.13)
LIVE	−0.00003 (0.01)	0.004 (0.61)	0.01 (1.93) **
Scale	0.63 (17.75) ***	0.50 (12.93) ***	0.57 (17.21) ***
Log likelihood	−363	−234	−357
Log-likelihood ratio	22.39 ***	31.31 ***	23.44***
WTP(NT$)	433	274	411

1. *, **, *** Indicate significance at levels of 10%, 5%, and 1%, respectively. 2. Log-likelihood ratio = (−2) × (Restricted Log-likelihood − Log Likelihood), $\chi^2(0.95, 7) = 14.05$.

The *WTP* of the option, existence and bequest values were estimated by median indicator. The median eliminates extreme observations and sensitivity to a specific distribution [59]. For the estimation of WTP with regard to follow-up responses, the mean was more biased than the median [60]. The median WTP can be calculated as follows:

$$\log(WTP^{\chi}) = X\beta + \sigma\varepsilon^{\chi}, \chi = 0.5 \quad (5)$$

According to Equation (5), the WTP of the option, existence, and bequest values were NT$433, 411 and 274, respectively. The aggregation for each non-use value was valued for 16,823 residents in 2012. Table 4 lists the detailed estimation of the TEV for the Swimming Carnival Event in Sun–Moon Lake. The sum of the non-use value was just over NT$18.7 million, which is just one eleventh of the use value. However, neglecting the intangible values will underestimate the true economic values of sport tourism, which will then be incorrect for decision-making.

Table 4. Total economic value of sport tourism.

	Consumer Surplus or WTP/Person	Population	Total Value (NT$ Million)
Recreational Value	NT$6695	25,000 participants	167.375
Option Value	NT$433	16,823 residents	7.284
Existence Value	NT$411	16,823 residents	6.914
Bequest Value	NT$274	16,823 residents	4.610

4.3. Discussion

The swimming carnival event is held at Sun–Moon Lake annually. The total economic value of this sport tourism event is approximately NT$ 186 million, including the use and non-use value (Table 4). This sum is conservative, as the environmental conservation considers only residents but excludes participants in the calculation. Participants are the main stakeholders of the swimming carnival event; their recreational benefit is an important externality of the use value. The non-use value is connected to residents' support and environmental conservation. Integrating the estimation of this study will help to provide more complete information on the benefits into cost/benefit analyses for sport events. The exclusion of intangible values underestimates a large portion of the benefits and means that it will not be possible to demonstrate the whole development of the Belt and Road.

This study extends the model of Huang and Wang [34], with a discussion of the differences between the legacy and bequest value for TEV in sport tourism. Sport legacy focuses on the future development of mega sports events, and must be evaluated after a period of time. Bequest value is one of the non-use values for environment. Although the swimming carnival event across Sun–Moon Lake is a sport tourism event, it is highly connected with the natural environment. This study introduces the environmental valuation method to sport tourism TEV. Bequest value is more suitable than legacy value for the TEV estimation of the Belt and Road development.

5. Conclusions

The evolution of sport events has developed from competition and culture, towards environmental preservation and sustainable development. This study introduces environmental research methods to sport events. Sport tourism in the Belt and Road development region needs to estimate the TEV of special events for cost/benefit analyses. We followed and extended the model of Huang and Wang [34] to evaluate the intangible non-use value for Swimming Carnival Event of Sun–Moon Lake in Taiwan. The sport event has an impact on the host community, which does not belong to legacy. According to the concepts of environmental economists, we replaced legacy value with bequest value in the TEV model.

Participants use Sun–Moon Lake for the Swimming Carnival Event directly. The recreational benefit was estimated by TCM with an on-site Poisson model to correct truncation and endogenous stratification of the on-site survey data. The direct use value of the Swimming Carnival Event was roughly NT$167 million, which represents the direct use value of environment resources combined with sport events and is relatively significant. The non-use value includes the option and existence values estimated by the double-bounded dichotomous choice model and survival functions from residents, for which the aggregation is NT$18.7 million. The main contribution of this study is that the TEV connects the environmental perspective with the Belt and Road development. The legacy and nonuse value has been debated clearly in sport tourism. The results provide information about the use and non-use value for policy-makers or managers. They can choose direct use value and option value or non-use values depending on their tasks, and apply the results for cost/benefit analysis and decision-making.

The major policy and managerial implications are that sport events must pay attention to the natural environment and try to reduce potential conflicts between the sports event and the natural environment. The results of this research are consistent with IOC policy. This study finds that residents are also stakeholders for sport events, which is in concordance with the research of Gursoy and Kendall (2006), who found that the success of an event requires the support of the residents [6]. Future research may apply the choice experiment method, to design choice scenarios with multiple alternatives and attributes for each choice set. The option value and nonuse values found using the choice experiment method may avoid double counting from respondents who are not familiar with these definitions.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Survival functions to estimate residents' willingness to pay for the option value.

Variables	Log-Normal	Weibull	Gamma	Exponential
Constant	4.61 (5.69)	4.74 (6.46)	4.61 (4.03)	4.69 (5.68)
EDU	0.04 (2.64) **	0.05 (3.39) ***	0.06 (2.67) **	0.04 (2.64) **
LINCOME	0.07 (0.82)	0.08 (1.01)	0.07 (0.57)	0.07 (0.82)
VILLAGE 1	−0.01 (0.06)	0.08 (0.37)	0.07 (0.23)	−0.01 (0.06)
VILLAGE 2	−0.089 (0.41)	0.04 (0.23)	−0.01 (0.04)	−0.09 (0.41)
VILLAGE 3	0.25 (1.44) *	0.36 (2.21) **	0.41 (1.66) *	0.25 (1.44) *
VILLAGE 4	0.06 (0.33)	0.04 (0.29)	0.09 (0.38)	0.06 (0.33)
LIVE	−0.0003 (0.07)	−0.00003 (0.01)	0.0016 (0.19)	−0.0004 (0.07)
Scale	0.74 (18.68) ***	0.63 (17.75) ***	1 (14.87) ***	0.74 (18.68) ***
Log Likelihood	−355	−363	−391	−355
Log-Likelihood ratio	14.01 *	22.39 ***	13.59 *	13.49 *
WTP(NT$)	384	433	388	384

Log-likelihood ratio = (−2) × (Restricted Log-likelihood − Log-likelihood), $\chi^2(0.95, 7) = 14.05$. *, **, and *** indicate significance at the levels of 10%, 5%, and 1%, respectively.

Table A2. Survival functions to estimate residents' willingness to pay for the existence value.

Variables	Log-Normal	Weibull	Gamma	Exponential
Constant	4.41 (5.63)	4.93 (7.02)	4.53 (3.84)	4.42 (5.65)
EDU	0.04 (2.67) **	0.06 (4.00) ***	0.07 (2.91) ***	0.04 (2.70) **
LINCOME	0.09 (1.15)	0.04 (0.53)	0.06 (0.49)	0.09 (1.14)
VILLAGE 1	−0.02 (0.08)	−0.09 (0.45)	−0.04 (0.11)	−0.02 (0.08)
VILLAGE 2	0.09 (0.43)	0.08 (0.47)	0.08 (0.27)	0.09 (0.43)
VILLAGE 3	0.144 (0.87)	0.22 (1.51) *	0.28 (1.13)	0.15 (0.87)
VILLAGE 4	0.03 (0.19)	−0.02 (0.13)	0.03 (0.13)	0.03 (0.19)

Table A2. *Cont.*

LIVE	0.004 (0.68)	0.01 (1.93) **	0.01 (1.50) *	0.004 (0.70)
Scale	0.70 (18.53) ***	0.57 (17.21) ***	1 (23.96) ***	0.72 (18.53) ***
Log Likelihood	−352	−357	−394	−352
Log-Likelihood ratio	11.74	23.44 ***	12.69	10.72
WTP(NT$)	363	411	368	364

Log-likelihood ratio = (−2) × (Restricted Log-likelihood − Log-likelihood), $\chi^2(0.95, 7) = 14.05$. *, **, and *** indicate significance at the levels of 10%, 5%, and 1%, respectively.

Table A3. Survival functions to estimate residents' willingness to pay for the bequest value.

Variables	Log-Normal	Weibull	Gamma	Exponential
Constant	3.46 (4.40)	3.61 (4.59)	2.96 (2.00)	3.19 (4.50)
EDU	0.05 (3.62) ***	0.07 (4.31) ***	0.10 (3.34) ***	0.02 (1.46) *
LINCOME	0.12 (1.52) *	0.12 (1.50) *	0.15 (0.99)	0.15 (2.06) **
VILLAGE 1	0.17 (0.77)	0.13 (0.61)	0.24 (0.59)	0.12 (0.60)
VILLAGE 2	−0.15 (0.68)	−0.23 (1.16)	−0.28 (0.73)	−0.05 (0.27)
VILLAGE 3	0.17 (1.03)	0.19 (1.16)	0.33 (1.04)	0.10 (0.61)
VILLAGE 4	0.14 (0.87)	0.12 (0.79)	0.17 (0.57)	0.10 (0.62)
LIVE	0.003 (0.53)	0.004 (0.61)	0.01 (0.49)	0.001 (0.18)
Scale	0.61 (13.61) ***	0.50 (12.93) ***	1 (31.64) ***	0.49 (5.38) ***
Log Likelihood	−224	−234	−264	−217
Log-Likelihood ratio	23.73 ***	31.31 ***	18.88 **	10.03
WTP(NT$)	253	274	287	229

Log-likelihood ratio = (−2) × (Restricted Log-likelihood − Log-likelihood), $\chi^2(0.95, 7) = 14.05$. *, **, and *** indicate significance at the levels of 10%, 5%, and 1%, respectively.

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