Analysis of willingness to pay (WTP) to support the sustainability of geotourism at Wediombo Beach, Gunung Kidul

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Abstract. The increase in tourism activities in the geotourism area of Wediombo Beach have triggered a cascade of effects, including economic growth and environmental degradation. To mitigate further environmental harm and support its preservation, financial backing is essential, particularly as this area is part of the UNESCO Global Geopark Gunungsewu. This research investigates the Willingness to Pay (WTP) of visitors at Wediombo Beach, seeking to determine their willingness to contribute to environmental protection and analyzing the factors influencing their WTP. The approaches used in this study are Contingent Valuation Method (CVM) and Travel Cost Method (TCM) to calculate WTP, utilizing multiple linear regression analysis to assess the impact of independent variables on WTP. Through interviews conducted with 67 respondents of accidental sampling using the bidding game dichotomous question method. The findings reveal that Wediombo Beach is currently undervalued, as the average WTP to support the sustainability of geotourism at the site is IDR 15,615.00 per individual per visit, totaling IDR 99,782,308.00. The key factors influencing visitors to the WTP at Wediombo Beach are perceived attractiveness and educational value.

1 Introduction

Tourism is an industry that can produce rapid economic growth, from increasing income, providing employment, and living standards, to stimulating other productive sectors [1]. Tourism also stimulates and contributes directly to developing and improving transportation, accommodation, cultural programs, cleanliness, and environmental sustainability [2]. Gunungkidul Regency has a large and quite potential tourism potential. The tourism sector in Gunungkidul Regency in 2021 contributed at least 7.1% of the total regional original income (PAD), which reached 23.4 billion rupiahs. One of the leading tours in Gunungkidul Regency is Wediombo Beach Tourism, the 4th most visited Tourist Destination Area (DTW) in Gunungkidul Regency, with 76,677 visitors [3].

Wediombo Beach is a tourist area as well as a water conservation area in Gunungkidul which has been designated as a Regional Marine Protected Area Reserve for the Waters Nature Reserve in Gunungkidul Regent Decree Number: 271/KPTS/2013 dated September 2nd, 2013, concerning Reserves for Marine Protected Areas [4, 5]. In addition, Wediombo Beach is also a geotourism area, one of the sites of the Gunung Sewu Geopark Area, which since September 2015 has been designated as a UNESCO Global Geopark [6].

Wediombo Beach Geotourism offers a tourism concept that highlights the beauty, uniqueness, rarity, and wonders of a natural phenomenon closely related to geological phenomena described in popular or simple language [7].

Increasing visitor activity in the Wediombo Beach geotourism area can have a positive impact in the form of an additional source of income for the surrounding community. However, it is essential to acknowledge that this growth also brings about adverse effects in the form of waste, pollution, and environmental damage, thus posing a threat to the sustainability of geotourism activities [8]. The environmental degradation resulting from the extensive tourist activities at Wediombo Beach, coupled with the impact of fish landing sites, constitutes a significant environmental concern [9]. This environmental deterioration is poised to impose unfavorable consequences on the ecosystem dan geosite.

Unfortunately, environmental degradation and geosite is still not perceived as a sufficiently serious issue by both the local community and visitors, mainly due to the common property nature of the site[10]. However, it is crucial to recognize that geosites and environmental ecosystems hold significant economic value. Consequently, concerted efforts are imperative to safeguard and preserve Wediombo Beach's geotourism
area by gauging tourists' willingness to pay (WTP) to ensure the continuity of geotourism. The willingness of visitors to contribute to the conservation of the environment within tourist areas is of paramount importance, and their WTP can be embraced as an entry fee to access these tourist attractions [11,12].

This research was conducted to find out the WTP, which aims to find out at what level visitors can afford to pay the cost of preserving the Wediombo Beach geotourism area if they want the environment to be good [13]. The total value of WTP is calculated to determine the estimated economic income of a tourism object in this study, namely the economic income of the Wediombo Beach geotourism object [14]. The willingness of visitors to replace the cost of sustainability services with WTP is related to the maximum satisfaction they get [15,16,17]. The data used in this study is primary data from structured interviews with visitors to Wediombo Beach. This study also aims to determine the factors that influence the value of WTP using the Contingent Valuation Method (CVM) and Travel Cost Method (TCM) by considering the variables of the respondent's age, travel costs (travel costs), frequency of visits, length of education, income, perceived value of education, and attractiveness. The hope is that research on the WTP value given by tourists can help tourist object managers develop sustainable geotourism at Wediombo Beach [18].

2 Data and method

2.1 Location and time of research

This research was conducted in the Wediombo Beach Area in Jepitu Village District, Girisubo, Gunung Kidul Regency, Special Province of Yogyakarta (DIY), as shown in Figure 1. Data collection occurred from December 2022 to January 2023 during Saturday and Sunday holidays. The method used is observation and field surveys.

2.2 Data dan sampel

The data used in this study are primary and secondary data. This study's primary data is obtained from the results of structured interviews using questionnaires to respondents who visited Wediombo Beach. The secondary data is research supporting data and the number of visitors to Wediombo Beach obtained from the Gunungkidul Regency Tourism Office in 2022. The sampling method used in this study is non-probability sampling, where not all populations have the same opportunity to become respondents. The respondents are visitors to Wediombo Beach, aged 15-64, and have an income.
Krejcie and Morgan method formula with an error rate of 10% as follows [19]:

\[
n = \frac{X^2 \cdot N \cdot P(1-P)}{(N-1) \cdot d^2 + X^2 \cdot P(1-P)} \\
n = \frac{(6390 - 1) \times 0.1^2 + 2.7055 \times 0.5(1 - 0.5)}{2,7055 \times 6390 \times 0.5(1 - 0.5)} \\
n = 67 \text{ sample} \quad (1)
\]

n : Sample Size  
N : Population Size  
X^2 : Chi Square Value  
P : Population Proportion  
d : Estimation Error

Based on the Krejcie and Morgan methods calculation results, the number of samples used in this study was 67 people.

2.3 Data Analysis method

Data analysis in this study was conducted using the Travel Cost Method (TCM) and Contingent Valuation Method (CVM) approaches. TCM is a method that assumes that the value of a recreation area is related to the travel costs visitors incur. Travel costs are calculated using the following formula:

\[
TC = Tr + BP + BK + TM + LL \quad (2)
\]

Description:
TC : Travel Cost (IDR/Person/Visit)  
Tr : Travel Cost (IDR/Person)  
BP : Parking Cost (IDR/Transportation)  
BK : Consumption Cost (IDR/Person)  
TM : Entrance Ticket (IDR/Person)  
LL : Another Cost

A Likert scale is used in this research to assess visitors' perceptions of educational value and attraction. The Likert scale ranges from the lowest value (1) to the highest (5) as known in Table 1. Then, average all the scores to get the perception of education and attraction.

Table 1. Likert scale of perception

<table>
<thead>
<tr>
<th>Likert scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly Disagree (SD)</td>
</tr>
<tr>
<td>2</td>
<td>Disagree (TS)</td>
</tr>
<tr>
<td>3</td>
<td>Undecided (U)</td>
</tr>
<tr>
<td>4</td>
<td>Agree (A)</td>
</tr>
<tr>
<td>5</td>
<td>Strongly Agree (SA)</td>
</tr>
</tbody>
</table>

CVM is a survey-based approach to estimate the extent to which individuals or communities value commodities that do not have a market, such as environmental goods [20]. The CVM method is carried out by asking people to directly state their willingness to pay for certain environmental services, such as the value of recreational services, based on a hypothetical scenario. This method has several dichotomies of questions, namely open-ended questions, bidding games, payment cards, and closed-ended referendum models [21]. This study uses a bidding game approach, which offers payable values from the smallest to the largest.

There are several steps in using CVM, which consist of six steps, namely 1) Compiling a hypothetical market, 2) Determining the amount of bid or auction, 3) Calculating the average WTP or WTA, 4) Estimating the supply curve, 5) Summing up the total value of WTP, and 6) Evaluate CVM calculations [22]. The following are the stages of implementing CVM in this study [23].

a) Estimated Average of WTP

The WTP value can be estimated using the average value of the total WTP value divided by the number of respondents using the following formula:

\[
EWTP = \frac{\sum_{i=1}^{n} W_i}{n} \quad (3)
\]

EWTP : Average of WTP value  
W_i : WTP respondent-i  
n : Numbers of respondents  
i : Respondent-i who are willing to pay

b) Summing up the Total Value of WTP Data

Estimating the sum of the data on the total value of WTP is done by converting the average value of WTP to the total population. The total value of the respondent's WTP is calculated using the following formula:

\[
TWTP = \sum_{i=1}^{n} W_i \left( \frac{n}{N} \right) \cdot P \quad (4)
\]

TWTP : Total of WTP  
W_i : WTP respondent-i  
n : The number of sample-i who is willing to pay  
N : Number of samples  
i : Respondent-i who are willing to pay

P : Number of population

c) Analysis of Factors Influencing WTP

The factors that might influence WTP's value were analyzed using inferential statistical analysis in the form of multiple linear regression tests. Yaity to find out the relationship between variables, as follows [24]:

\[
WTP = \beta_0 + \beta_1 VU + \beta_2 LP + \beta_3 PD + \beta_4 TC + \beta_5 FK + \beta_6 DT + \beta_6 NE + \epsilon \quad (5)
\]

WTP : WTP value of respondents (IDR)  
\beta_0 : Intercept  
\beta_1, \ldots, \beta_6 : Regression coefficient  
VU : Age variable (Year)  
LP : Education (Year)  
PD : Income (IDR)  
TC : Travel Cost (IDR)  
FK : Visit frequency  
DT : Total value of perceived attractiveness  
NE : Total value of perceived education  
i : Respondent-i (i = 1, 2, ..., n)  
\epsilon : Error
3 Result and discussion

This research has a scenario description which is the government and managers plan to carry out an effort to develop the Wediombo Beach tourism area based on sustainable geotourism that prioritizes carrying capacity, conservation, uniqueness, scarcity, and environmental education and geotourism. This is because the Wediombo tourist area has a uniqueness, which is the UNESCO Global Geopark Gunungsewu site (an ancient volcanic area) and the Gunungkidul Marine Protected Area.

It requires contributions from visitors to support this development which comes from the entrance fee. These funds will later be allocated, among others, for educating the public and visitors regarding the uniqueness of geotourism on Wediombo Beach, developing Wediombo Beach's geotourism potential, preventing and anticipating environmental damage and threats, training, water conservation on Wediombo Beach, procuring facilities, and improving security and services in tourist areas.

The WTP value is obtained using the bidding game method. This bidding game method is a method used to get the WTP value of visitors to Wediombo Beach where in the interview stage, the offer value is given to the respondent starting from the lowest value, and then the value will continue to be increased until the respondent is not willing to pay that price. The amount of the bidding value in this study is determined based on the ticket price for entering Wediombo Beach, which is IDR 5,000.00. When answering the questionnaire, before the willingness to pay (WTP) offer was made, the respondent was asked in advance regarding the visitors' opinion of whether the Wediombo Beach entry ticket price was valid, IDR5,000.00, which included insurance. After that, visitors were asked about their willingness to pay for the sustainability of Wediombo Beach geotourism.

Based on the results of a survey that has been conducted, it is known that 97% of visitors are willing to pay a higher price for sustainable geotourism at Wediombo Beach as shown in Figure 2. As many as 65 respondents stated that they were willing to pay WTP because the entry price was still affordable and the facilities at Wediombo Beach still needed improvement. Meanwhile, two visitors were unwilling to pay because they thought local tax funds were already available and residents were not subject to retribution.

3.1 WTP to Supporting Geotourism at Wediombo Beach

The WTP value is shown in Figure 3, where it is known that the distribution of the WTP value for Wediombo Beach visitors ranges from IDR 10,000.00 to IDR 50,000.00, where the WTP value shows results in multiples of IDR 5,000.00. It is known that the highest value of WTP is IDR 50,000.00 and the lowest WTP value is IDR 10,000.00, and the median WTP value is IDR 25,000.00.

The estimated average value of WTP is known from the total value of WTP divided by the number of visitors who are willing to pay for WTP, as follows:

$$\text{EWTP} = \frac{\sum_{i=1}^{n} \text{WTP}_i}{n} = \frac{\text{Rp}1,015,000.00}{85} = \text{Rp}. 15,615,00$$ (6)

Based on the above calculations, the average WTP value to support the sustainability of geotourism on Wediombo Beach is IDR15,615.00. Therefore, the current entry ticket price is relatively cheap, so visitors are still willing to pay more.

The total value of the WTP can be determined by calculating the conversion of the average sample data into the average data of the study population. The results of estimating the total value of the WTP can be used to estimate the amount of income that might be obtained by the manager of the Wediombo Beach tourism object, to support the sustainability of geotourism. The following is a calculation to estimate the income of the Wediombo Beach tourist attraction shown in Table 2.

<table>
<thead>
<tr>
<th>No.</th>
<th>WTP (IDR)</th>
<th>Total Tourism</th>
<th>Population</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>10000</td>
<td>36</td>
<td>3539</td>
<td>Rp35,390.769</td>
</tr>
<tr>
<td>2.</td>
<td>15000</td>
<td>14</td>
<td>1376</td>
<td>Rp20,644.615</td>
</tr>
<tr>
<td>3.</td>
<td>20000</td>
<td>5</td>
<td>492</td>
<td>Rp9,830.769</td>
</tr>
<tr>
<td>4.</td>
<td>25000</td>
<td>1</td>
<td>98</td>
<td>Rp2,457.692</td>
</tr>
<tr>
<td>5.</td>
<td>30000</td>
<td>5</td>
<td>492</td>
<td>Rp14,746.154</td>
</tr>
<tr>
<td>6.</td>
<td>35000</td>
<td>2</td>
<td>197</td>
<td>Rp6,881.538</td>
</tr>
<tr>
<td>7.</td>
<td>50000</td>
<td>2</td>
<td>197</td>
<td>Rp9,830.769</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>6390</td>
<td></td>
<td>Rp99,782.308</td>
</tr>
</tbody>
</table>

This research is limited to the WTP (Willingness to Pay) values and the factors influencing these values.
However, there are still many aspects that require further valuation. Therefore, further research related to the economic valuation of resources in Wediombo Beach is needed, so its potential can be further developed. This is supported by research findings indicating a higher WTP value compared to the current fee, suggesting that it is still relatively underpriced.

### 3.2 Factors are influencing WTP value

Multiple linear regression tests are used to analyze the factors that influence the dependent variable on the value of WTP based on the independent variables, namely age, education level, income level, travel level, visit frequency, and visit frequency. The results of multiple linear regression are obtained in Table 3 below.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Koefisien</th>
<th>Sig</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.489</td>
<td>.016</td>
<td>(-)</td>
</tr>
<tr>
<td>Age</td>
<td>-1.868</td>
<td>.067</td>
<td>No Effect</td>
</tr>
<tr>
<td>Education</td>
<td>0.893</td>
<td>.375</td>
<td>No Effect</td>
</tr>
<tr>
<td>Income</td>
<td>-0.052</td>
<td>.959</td>
<td>No Effect</td>
</tr>
<tr>
<td>Travel Cost</td>
<td>-1.480</td>
<td>.144</td>
<td>No Effect</td>
</tr>
<tr>
<td>Visit Frequency</td>
<td>1.133</td>
<td>.262</td>
<td>(-)</td>
</tr>
<tr>
<td>Perception of Attraction</td>
<td>2.609</td>
<td>.011</td>
<td>Significant Effect</td>
</tr>
<tr>
<td>Perception of Education</td>
<td>-3.028</td>
<td>.004</td>
<td>Significant Effect</td>
</tr>
<tr>
<td>R²</td>
<td>0.287</td>
<td>(-)</td>
<td>(-)</td>
</tr>
<tr>
<td>F Statistic</td>
<td>3.391</td>
<td>.004b</td>
<td>(-)</td>
</tr>
<tr>
<td>Durbin Watson</td>
<td>2.168</td>
<td>(-)</td>
<td>(-)</td>
</tr>
</tbody>
</table>

Based on the calculation results in Table 3, it can be explained that the R-Square value is 0.287, which means that all variables, age, education level, income level, travel expenses, frequency of visits, perceived attractiveness, and educational value has an effect of 28.7% to the WTP value. In comparison, 71.3% is influenced by other variables. In addition, from the results of the F test that has been carried out, it was found that the Fcount value shows several 3.391, which is greater than Ftable, which is 2.17 with an alpha of 5%. Therefore, the independent variables simultaneously affect the dependent variable significantly, and H0 is acceptable.

Based on the multiple linear regression test, it was found that two variables had a significant effect on the WTP value, namely the variable perceived attractiveness and educational value. The findings of this study are consistent with the research conducted by Amanda in the year 2009 that there is a significant influence between WTP and the variable perceived attractiveness and educational value. The significant value generated by the perception of visitor attractiveness is 0.011, and for visitors, perception is 0.004, where both show numbers below 0.05 [25]. The coefficient value indicating a positive number also indicates a positive influence and vice versa, as shown in Table 3.

Multiple linear regression tests also show that other independent variables, such as age, education level, income, travel costs or travel costs, and the frequency of visits, do not significantly affect the value of the WTP. This is evidenced in Table 3, where all the independent variables show significance above 0.05, indicating that the independent and dependent variables do not affect each other.

### 4 Conclusion

This study shows that the WTP value to support the sustainability of geotourism at Wediombo Beach is IDR 15,615.00 per visit per individual. The WTP value obtained is higher than the current entrance ticket, IDR 5000.00 which mean the value now is still undervalue. An estimated total value of WTP was also obtained through this WTP, namely IDR 99,782,308.00. The factors that affect the WTP value of visitors to Wediombo Beach geotourism are the perceived attractiveness and educational value of Wediombo Beach visitors.

So therefore, further research is required regarding the total valuation at Wediombo Beach, given its economic potential and the resources that can be further developed, considering the higher value of WTP compared to the current levy price.

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