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RESEARCH ARTICLE

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Economic Valuation on the Development Plan of the Flower Garden Area using Contingent Valuation Method

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ABSTRACT

Non-market value plays a crucial role in the economic valuation of natural resources and the environment. Therefore, this study aimed to estimate the non-market value derived from the development plan of a flower garden area in the Blora Regency. This valuation included individual and aggregate willingness to pay (WTP) and the factors influencing WTP. This study used the Contingent Valuation Method (CVM) as the research approach, with logistic regression as technical analysis. A total of 250 questionnaires were completed by residents of Blora, resulting in a mean value of individual non-market WTP of IDR 10,605 as an entry fee and an aggregate value of IDR 97,567,748/year. The results show that the higher the bid, the lower the probability of paying. Another interesting outcome was that people with an income of over five million and living close to the garden development plan area had a greater probability of paying than others. These findings provide an overview of the Blora government's efforts to improve access to areas and facilities within gardens to attract people outside of the characteristics that significantly affect WTP.

Introduction

Natural resources and the environment available on Earth greatly benefit human life. The magnitude of those benefits can be transformed into a value that reflects the "price" against them [1]. In fact, this value includes many components on a market and nonmarket basis [2]. In addition to classifying market and non-market value, the benefits of natural resources are identified by their total economic value, including use and non-use value. Use value includes direct and indirect values and option values (for some literature) obtained from natural resource utilization activities. Meanwhile, non-use value includes existence and bequest value, despite the absence of concrete utilization activities. In other words, the use of value components can include market value (e.g., wood from forests or fish from waters) and non-market value (e.g., recreation, social interaction, or disaster protection). However, the non-use value component is related only to non-market value. Most aspects of non-market value, including use and non-use value, are ignored in economic calculations because they are not commonly traded, and the price is difficult to calculate. Therefore, the total economic value of natural resources tends to be lower than their actual value if there is only one element between the market and non-market [1]. Case studies on the importance of overcoming undervalued assessment have been carried out in Sumatera for natural fauna resources [3], Greece for developing urban parks [4], and Korea for developing a peace park [5].

Gardens and parks are natural resources that cannot be separated from being undervalued. The valuation of these gardens often does not consider nonmarket elements. At the same time, gardens have been proven to provide various benefits from economic, social, cultural, environmental, and health perspectives. Economic benefits, such as increasing regional income, are often categorized as market value, while the social (participating in the broader community), cultural (a place for preserving culture), environmental (improving clean air quality), and health (a place for free sports) benefits tend to be included in non-market value. Carrying out non-market valuation is crucial to avoid undervalued garden calculations. In this regard, the local

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government of Blora Regency, Central Java Province, plans to build a garden area, especially a flower garden in the city center. In policymaking, gaps often arise between the supply of scientific information and relevant requests from policymakers [4]. Policymakers are expected to improve society's welfare through program implementation by providing maximum benefits. However, they often need more study material regarding how much benefit the community acquires, especially benefits that do not have a market value. Therefore, non-market assessments will be used as scientific information that plays an important role in educating decision makers about biodiversity benefits [6]. This science can also provide input on natural resource management, environmental protection, and policymaking, as well as encourage public input and involvement [7].

Assessment of non-market value can be calculated using Stated Preferences (SP) through Contingent Valuation Method (CVM). This method describes a stylized market to elicit information about the maximum amount a person would pay for a good or service in the absence of market value data [8]. Other studies also confirm that the CVM can be used to estimate both use and non-use value cases. CVM seeks to directly express changes in utility in monetary values in the form of a country currency [9]. Stated Preferences not only include CVM, but also a Choice Experiment (CE). Compared to the Choice Experiment (CE), the CVM is easier to apply based on the answer choices used. Based on this objective, CE studies are unclear to survey takers because of the multi-attribute nature of the good [10]. Moreover, CVM is more suitable for use in ex-ante research objects with hypothetical market conditions, as the assessment is directed at scenarios of policy changes [1]. This is in accordance with the research object of this study, which is the garden development plan. The key to successful park development and management depends on stakeholders, including the community, who provide the value of willingness to pay for that park [11].

Willingness to pay (WTP) value can be derived from a demand curve with similar characteristics. The assumption is that what people sacrifice is what they obtain [12]. As market demand consists of paid prices and consumer surplus, non-market demand also has the same components. The difference is that, for non-market goods, for example, changes in environmental quality will increase consumer surplus, thereby shifting the demand curve [1]. The area of additional consumer surplus from the non-market aspect may illustrate the economic value resulting from environmental improvements, which is also discussed in this paper. WTP implementation was also applied to assess groundwater wells in Kupang [13]. The WTP instrument used in this study is the entrance ticket to the flower garden area in the Blora Regency if the location is built. Because it is still a development plan, the location is yet to be available, meaning that the nominal entry ticket asked of the public is only an estimate of the future price/estimate/prediction when the garden is finished. The selection of entrance tickets as WTP follows previous literature on Parks in Sri Lanka [14] and Parks in Albania [15]. Therefore, this study aims to calculate the WTP value individually and in aggregate. The aggregate value can be calculated by multiplying individual WTP by the estimated total number of visitors. In addition, this study attempts to investigate the variables that affect the WTP for flower gardens.

Method

Study Area

This study was conducted in rural communities in Blora Regency from July to December 2022. The detailed research location was an ex-golf course of 12 hectares in Kunden Village, District Blora. Previously, at the same location, the government had tried to convert this land into a motocross circuit and campground, although in the end, all these activities came to a halt. However, this location has great potential, for instance, it is a strategic location in the city center, has high accessibility, and is close to tourism supporting facilities such as hotels and restaurants. Therefore, the Blora government plans to develop one-third of the land into a flower garden area, especially for bougainvillea flowers. The local government claims that this flower is an icon of Blora Regency. It is hoped that the development of this flower garden will become a tourist icon in Blora Regency. When this research was conducted in 2022, the land was only filled with trees, weeds, and neglected buildings. In addition, the shape of the land was uneven, forming low hills (Figure 1).

Data Collection

Both primary and secondary data were used in this study. Secondary data were gathered from the Blora Regency Government through literature review to support the analysis. Primary data were obtained by conducting questionnaire-based interviews with the community in the Blora Regency. The primary data used included the characteristics and behavior of the respondents, as well as their willingness to pay. The number of samples was quantified using the Slovin formula [16].

$$n = \frac{N}{1+(N\ x\ e^2)} \quad (1)$$

where n is minimum sample size, N is the total population, and e is the margin of error.

The population used was the 2021 Blora population data of 886,147 people. The minimum sample size used in this study was 100, with a 10% margin of error. However, this study used a sample of 250 respondents to better represent the population. Samples were collected by combining cluster and snowball sampling techniques. Cluster sampling is a sampling technique based on geographic area division, whereas snowball sampling is a technique used to select respondents based on recommendations from previous respondents [17]. The cluster included 12 sub-districts around the former golf course area, namely the sub-districts of Kunden, Beran, Bangkle, Kedungjenar, Mlangsen, Jetis, Tambahrejo, Kauman, Sonorejo, Tempelan, Tegalgunung, and Karangjati. The number of samples in each cluster was adjusted to the population proportion of the 12 sub-districts. Snowball sampling was applied to determine the respondents in each sample.

Data Analysis Method

The Analysis of Willingness to Pay with Contingent Valuation Method

CVM was used as the primary approach in this study. The CVM is a direct method of economic valuation through public WTP [1]. This CVM approach has also been applied to previous studies who calculated the WTP for tourist parks in Bandar Lampung City [18], and who estimated the existence value of the Ciliwung Watershed [19]. There are several stages in implementing CVM [20], some of which can be categorized as follows.

1. Making a market hypothesis

The market hypothesis can be interpreted as a development plan or change in the environmental quality of natural resources prepared by the relevant agency as the basis for the questionnaire. An example is a government policy plan. The questionnaire must include information describing the current condition of natural resources, the expected state of natural resources according to a hypothetical market, and the government obtaining funds (e.g., taxes or entrance tickets).

2. Acquiring the bid value

The funds that a government must realize in a hypothetical market are through bids. If natural resources are to be used as tourist attractions, then entrance tickets are a suitable bid because they are direct and appropriate for the target. The selection of bid combinations for entrance tickets is based on the price of entrance tickets for similar tours in the area or refers to written regional regulations regarding levy rates for recreational areas (e.g., Blora Regent Regulation No. 6 of 2017). Based on this, this study determines five combinations: IDR 3,000; IDR 5,000; IDR 8,000; IDR 10,000; and IDR 12,000. After selecting the combination, bids were submitted to the respondents randomly using the dichotomous choice single-bounded (DC-SB) technique. The question is a multiple choice "yes, willing" or "no".

3. Estimating the average value of WTP

The average value indicates the WTP value. The WTP value can be obtained using a formula that considers the outcome model regression. If the model includes another independent variable besides bid, then the calculation of individual WTP follows the formula proposed by previous literature [4]:

$$median\ wtp = \frac{B_0}{|B_A|} \quad (2)$$

$$mean\ wtp = \frac{\ln[1+e^{(B0)}]}{|B_A|} \quad (3)$$

Where BA is the Bid coefficient value, and $B0$ is the constant value plus the sum of the products of the independent variables' coefficient (excluding Bid) with the mean values of the corresponding independent variables.

4. Estimating the bid curve

The bid curve can be obtained by regressing WTP as a dependent variable with several independent variables. However, if other variables are not involved, a bid curve can be created manually by examining the raw bid acquisition data. The Y axis is the Bid, and the X axis is the number of respondents who answered "yes".

5. Aggregating data

The aggregate WTP can be calculated by multiplying individual WTP ($wtpi$) with the estimated total visitors per year (N).

$$aggregate\ wtp = wtpi \times N \quad (4)$$

The Analysis of Factors Affecting Willingness to Pay with Logistic Regression

Logistic (logit) regression was used in this study because the dependent variable is a bid, which consists of binary data (0.1). The dependent variable, WTP, included the public's response to the garden entrance fee, whereby the choice was to pay (1) or not to pay (0). The econometric model is constructed as follows:

$$\ln\left(\frac{\mu_i}{1-\mu_i}\right) = wtp_i = \beta_0 + \beta_1\, bid_i + \beta_2\, gender_i + \beta_3\, age_i + \beta_4\, educ_i + \beta_5\, income_i + \beta_6\, distance_i + \beta_7\, family_i + \beta_8\, visits_i + \beta_9\, expenses_i + \varepsilon_i \quad (5)$$

where μ is the probability of the occurrence of several characteristics with a response value of y=1, and 1-μ can be interpreted as the likelihood of the absence of these characteristics [21]. Meanwhile, symbol *i* means an individual in cross-section data, β_0 means intercept in model, $\beta_{1,2,\ldots 9}$ is the coefficient of each variable, and ε_i is an error. The description of each variable is stated in Table 1.

When interpreting the logit model, the result must be transformed into a marginal effect. The value of the marginal effect is used to determine the probability of each independent variable for the possibility of answering "willing to pay" to the dependent variable. The advantage of the marginal effect is that it is not too sensitive to changes in model specifications [22]. When new variables were added to the model, the value of the marginal effect did not change significantly.

Table 1. Variable description.

Variables	Description
Wtp	Willingness to pay: 1 if willing, 0 if not
Bid	Offered value in the form of entrance fee to flower garden: numeric data from IDR 3,000; IDR 5,000; IDR 8,000; IDR 10,000; IDR 12,000
Gender	Gender: 1 if male, 0 if female
Age	Age in the form of binary data per category: 12–25 years old (base); 26–45 years old; 46–65 years old; > 65 years old
Educ	Level of education in the form of binary data per category: no school (base), elementary graduate, junior high school graduate, senior high school graduate, college graduate
Income	Average monthly income in the form of binary data per category: ≤ IDR 2,000,000 (base); IDR 2,000,001–3,000,000; IDR 3,000,001–5,000,000; ≥ IDR 5,000,001
Distance	Home distance to research location in the form of binary data per category: ≤ 1 km (base); 1.1–2 km; 2.1–3 km; > 3 km
Family	Number of family member in one house in the form of binary data per category: 1 people (base); 2–4 people; ≥ 5 people
Visits	Average number of visits to garden per month in the form of binary data per category: 0 time (base); 1–3 times; 4–5 times; ≥ 6 times
Expenses	Average family expenditure for tourism per month: 1 if > IDR 200,000; 0 if ≤ IDR 200,000

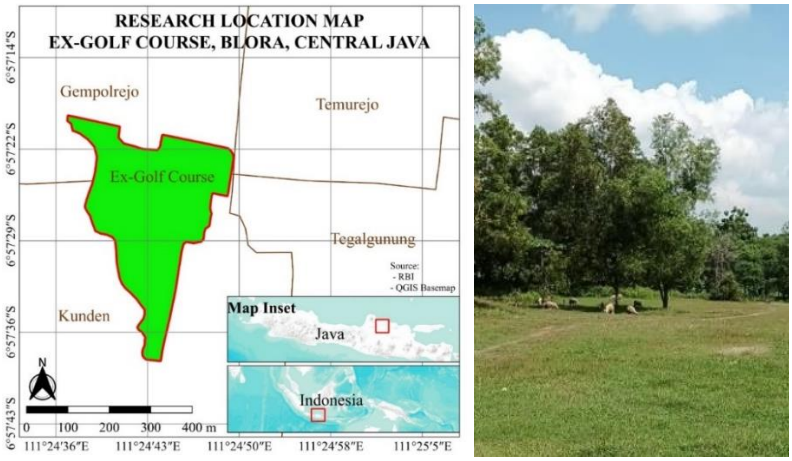

Figure 1. Ex-golf course land Blora Regency.

Results and Discussion

Socio-economic Characteristics of Respondents

This study used a sample of 250 respondents living in the Blora Regency with various characteristics. The survey results showed that most of the respondents were women (63.6%) and were in the age range of 21–78 years, with an average of 47 years. From a socioeconomic perspective, most of the respondents were high school graduates (44.8 percent). Most respondents come from middle to lower-income groups with income below or equal to IDR 2,000,000. This value is equivalent to the Blora District's minimum wage of the IDR 1,904,196. In addition, the results also illustrate that 85% of the respondents were homemakers. The last characteristic was the number of family members and the distance from the respondent's house to the location of the planned garden. The survey results showed that most respondents (71%) lived with two to four family members, and the average distance from the respondent's house to the location was 2.2 km.

The Analysis of Contingent Valuation Method

Constructing a Hypothetical Market

The hypothetical market for this research is local government policy in the form of plans to develop flower garden tourism in the ex-golf course area in Blora Regency. This hypothetical market was the basis of the questionnaire. Therefore, the questionnaire included a description of the location's current condition, including only trees, wild grass, and empty buildings with no activity. This 12-hectare (ha) area has also been dormant for several years. Meanwhile, the description of the expected conditions is that part of the 12 ha will be built into a bougainvillea flower garden (according to government requests). This garden has plant arrangements with attractive architecture, eye-catching visuals, and a cool air circulation. The community can use existing spaces for socializing, exchanging culture, and so on. Based on this information, it is assumed that respondents can imagine whether the garden is built and understand the possible benefits that they will accept. In this survey, the types of benefits emphasized to the respondents were those with no market value. Thus, respondents had an idea about the price of non-market values. This price is people's willingness to pay to enter the tourist area. CVM research with a hypothetical market in the form of a development plan and focusing on non-market value was also applied to the urban park project in Thessaloniki, Greece [4]. This non-market WTP is then proxied by entry tickets, which are also commonly used in research on economic valuation with tourism objects in Lampung [23] and Malaysia [24].

Deriving Bid Value and WTP Curve

The amount of the Bid is based on a standard entrance fee on similar tours in the Blora and the surrounding area in 2022, as stated in Blora Regent Regulation [25]. This study sets five types of prices as the starting Bid from: IDR 3,000; IDR 5,000; IDR 8,000; IDR 10,000; and IDR 12,000. Furthermore, the technique elicitation used in this study was dichotomous choice single-bound (DC-SB). The DC-SB technique is a closed question type that provides one price with two options: "yes, willing to pay" or "no". Respondents were randomly offered one of the five prices and only replied "yes" or "no". Each price was randomly assigned to 50 respondents, which then produced a total of 250 respondents. Before choosing an answer, the respondents were given another understanding that the price offered only includes non-market value elements. Market value elements (e.g., the share of income from the garden, total direct income to the community, such as from MSMEs (Micro, Small, and Medium Enterprises), and regional income [26]) were not considered. Table 2 depicts that in every Bid, the percentage of willing is more significant than non-willing. Even at a bid of 5,000, the willingness rate is 100, meaning that people who are offered a bid of 5,000 agree that this price is suitable for representing the non-market element in the flower garden. Most respondents were willing to pay, accounting for 76.4%.

Table 2. Percentage of bid.

Bid (IDR)	Respondents answer (%)		Total (%)
	Willing	Not willing	
3,000	86	14	100
5,000	100	0	100
8,000	84.3	15.7	100
10,000	61.2	38.8	100
12,000	50	50	100
Total	76.4	23.6	100

In addition to tables, the distribution of bid values can also be illustrated by the willingness-to-pay curve. This non-market WTP curve has the same shape as that of the demand curve. It exhibits a negative slope from the top left to the bottom right. In microeconomic theory, the WTP shows the highest price that society is willing to sacrifice [12]. Figure 2 depicts the relationship between the number of respondents willing to pay and the bid value offered. In this case, the number of respondents was counted cumulatively from highest to lowest. The higher the bid, the less people will pay and vice versa.

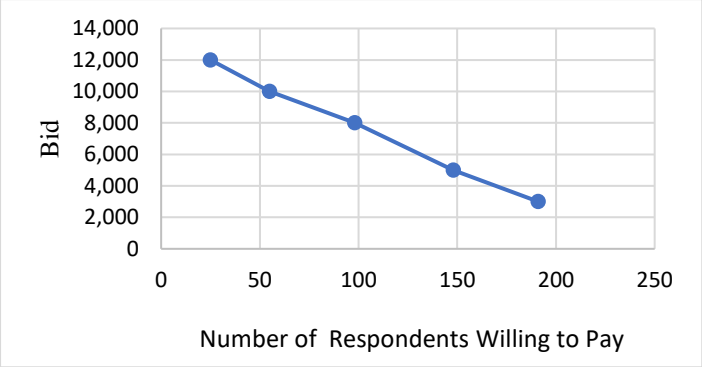

Figure 2. Willingness to pay curve.

Estimating Individual and Aggregate WTP

Although the WTP distribution of willingness to pay was already obtained after the survey process, the results could not be calculated directly into the individual/average WTP. As this study uses DC-SB as the elicitation technique, in which every respondent is limited to one price offered, a specific formula is required to calculate individual WTP, considering other independent variables entered in the research model. Table 3 shows that the median and the mean WTP results were obtained in the same range at IDR 10,000–11,000. However, the mean WTP was higher for IDR 10,605. This price indicates the estimated average entrance fee to the flower garden area considering non-market benefits. If the government directly uses this price as an entry ticket, then there is still the possibility of undervaluing since this price only includes non-market value. Likewise, if the government sets ticket prices considering only market value, it will be undervalued. To avoid undervaluing entrance tickets, the government needs to set ticket prices by combining non-market value prices, as estimated in this study, with market value prices. Moreover, at a 95% confidence interval, the WTP values for both the median and mean were in the same range of IDR 9,000 to 11,000. This value made sense, as it was still in the range bid offered in the survey, namely IDR 3,000 to 12,000.

Table 3. Individual and aggregate WTP results.

WTP	Individual WTP (IDR)	95% conf. interval		Estimated total visitors (people)	Aggregate WTP (IDR/year)
Median	10,597.00	9,410.53	11,783.47	9,200	97,492,400
Mean	10,605.19	9,404.74	11,808.64	9,200	97,567,748

Furthermore, aggregate WTP is the total price that the population is willing to pay in a certain period. The aggregate WTP also represents the total non-market value in a year if the flower garden development plan in Blora is genuinely realized. This study uses the estimated total visitors from the number of visitors in the previous year in Blora as a multiplier factor. In 2021, object tourism in Blora totaled 22 places, with a total of 202,385 visitors per year [27]. Based on this data, every tourism area was estimated to have approximately 9,200 visitors per year. Table 3 also indicates the aggregate WTP results for the median and mean calculations. Although the results are the same at around 97 million IDR per year, the better value is the mean WTP. The use of the mean WTP follows that of previous studies[4,23,24]. The aggregate WTP is IDR 97,567,748. This value is estimated to become a total non-market benefit converted into economic value on the flower garden plan development in Blora per year. This value cannot be considered the total economic value because it only finds non-markets. Whereas Total Economic Value (TEV) is the sum of direct, indirect, option, and existence [26]. This means that TEV are not only non-market elements, but also market elements. So, TEV can be obtained by combining the total non-market value in this study with the total market value (e.g., the share of income from the garden, total direct income to the community such as from MSMEs, and regional income [26]).

The Analysis of Factors Affecting Willingness to Pay

Table 4 displays the marginal effect results for logit regression. The dependent variable used in this research is WTP, while all independent variables, excluding bid, are transformed into dummy variables. The result shows that only three of the nine variables, such as bid, income, and distance, have a p-value below alpha (0.05). This means that the variable had a significant influence on WTP. The results also indicated that bid had a negative relationship with WTP. If the bid value offered to the respondent increased by one IDR, the probability of answering "yes" in willingness to pay would decrease by 0.0074%, ceteris paribus. On the other hand, the lower the bid offered, the higher the respondent's probability of giving the willingness to pay. This result follows the theory of demand law, where price and quantity have a negative relationship; when the price increases, the quantity decreases. The negative relationship between bids and WTP also aligns with previous studies [4,24]. Even though the percentage of change is small, the price factor often determines the respondents' decisions to answer "yes" or "no". Therefore, if the government slightly increases the nominal entrance ticket price, it will reduce the number of visitors. The existence of a flower garden is no longer interesting to visit.

Table 4. Logit regression marginal effect results.

Variables	Logit		
(Dependent: WTP)	Koef	St. Eror	P-value
Bid	–0.0000743	0.000	0.000***
Gender	–0.028	0.051	0.578
Level of Education: no school (base)			
Elementary graduate	0.146	0.119	0.218
JHS graduate	0.136	0.119	0.251
SHS graduate	0.081	0.115	0.479
College graduate	–0.021	0.135	0.879
Average monthly income: ≤ IDR 2,000,000 (base)			
IDR 2,000,001 – 3,000,000	0.078	0.061	0.203
IDR 3,000,001 – 5,000,000	–0.010	0.083	0.904
≥ IDR 5.000.001	0.179	0.073	0.014**
Age: 12-25 years old (base)			
26-45 years old	0.088	0.137	0.520
46-65 years old	0.071	0.138	0.608
> 65 years old	–0.053	0.163	0.745
1.1 – 2 km	–0.021	0.068	0.755
2.1 – 3 km	0.001	0.063	0.987
> 3 km	–0.235	0.104	0.024**
Number of family member: 1 people (base)			
2-4 people	0.016	0.147	0.914
≥ 5 people	–0.019	0.151	0.901
Number of visits: 0 time (base)			
1-3 times	–0.057	0.058	0.328
4-5 times	–0.032	0.099	0.745
≥ 6 times	–0.066	0.101	0.515
Tourist expenses	–0.057	0.056	0.308
Hosmer Lemeshow Test	0.1296		
Pearson Test	0.1704		
McFadden P-seudo	0.187		
Correctly Classified	82%		

Notes: ***) significance level at α 1%, **) significance level at α 5%, *) significance level at α 10%; number of observations: 250.

Income variables were divided into four categories. The first income category (≤ IDR 2,000,000) became the base group to another category such as category two (IDR 2,000,001–3,000,000), category three (IDR 3,000,001–5,000,000), and category four (more than IDR 5,000,000). The results show only category four, which influences WTP. Coefficient indicates a positive value. Respondents earning above IDR 5,000,000 had a 17.9% higher probability of replying "yes, willing to pay" than those in the base group, ceteris paribus. This means that people with higher incomes were more interested in visiting the bougainvillea flower garden. This result is similar to previous studies in China [28] and Lithuania [29], where people with high incomes tend to pay more than those with low incomes.

Another variable that significantly influenced WTP was the distance from the respondent's house to the research location. The distance used in the model was transformed from categorical data to dummy variables. There are four categories of distance variable. The first category was less than 1 km, becoming the base group. The results show that respondents living 3 km or more around the flower garden had a 23.5% lower probability of paying tickets compared to respondents in the base group, ceteris paribus. The local community that stayed near the location tended to pay more than those far from the planned garden area. The effect of proximity between the area under study and the respondents' place of residence is so influential and interdependent that their socioeconomic characteristics influence their WTP value [30]. This result is supported by a previous study [4] that proved that distance and WTP have a negative relationship. The farther the distance, the higher the possible additional cost, and so people were reluctant to pay for expensive entrance tickets.

Conclusion

The research findings show that the individual non-market value of willingness to pay is IDR 10,605.19. In comparison, the aggregate non-market value of WTP of IDR 97,567,748 per year is obtained by multiplying the individual WTP by the average number of visitors per object tourism per year in Blora. In addition, the logit model shows that bid and distance to the study location have a negative connection with WTP. The more Bid, the lower the probability of answering "yes" in willingness to pay. For the distant characteristic, respondents whose houses were more than 3 km away had a lower probability of paying than respondents whose houses were less than 1 km away. In the income variable, Respondents with income above IDR 5,000,000 have a higher probability of paying compared to respondents with income below IDR 2,000,000.

These results can be used to make several recommendations to the Government of Blora in developing flower gardens. First, based on the negative relationship between Bid and WTP, the government should make the price more affordable to increase society's interest in visiting the garden. Second, based on the relationship between income and WTP, the government is recommended to provide additional facilities, cleanliness, and good services to raise the public with low earnings. Third, regarding the factor distance results, only the local community enjoys the garden, so the local government advocates providing easy road access and affordable public transportation with clear directions. Therefore, people outside the Blora Regency are interested in coming up.

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