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Analysis of willingness to pay visitors to ecotourism: The case of the Pindul Cave, Yogyakarta

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ABSTRACT

This research aims to identify factors that influence willingness to pay in order to improve environmental quality at the Pindul Cave tourist attraction, Gunungkidul Regency, Yogyakarta. This study uses primary data with 95 respondents selected through a purposive sampling technique. The contingent valuation method (CVM) is employed to analyze the willingness to pay. The results show that 81.05% of visitors are willing to improve the environmental quality of the Pindul Cave tourist. According to the logistic regression, the Education level, recreation costs, and frequency of visits have a positive influence on willingness to pay, but the number of dependents has a negative influence on willingness to pay. However, income and age do not influence the willingness to pay to improve the environmental quality of the Pindul Cave tourists. This research recommends that managers of Pindul Cave tourists carry out intensive promotions, add facilities for visitors such as parking areas, clean toilets, rubbish boxes, and food and souvenir zones, and introduce the natural and cultural potential that exists at tourist attractions.

Introduction

Tourism is a dynamic economic sector that needs more attention to develop well (Devi et al., 2021). In practice, developing tourist destinations requires a comprehensive study that considers the main points for building community skills and abilities (Devi et al., 2023). Tourism development is regulated in Tourism Law No. 20 of 2009. According to Article 11, the government and tourism institutions carry out research and development in the tourism sector to support the development of tourist villages. Given the importance of tourism for community development, the government has launched a policy to make tourism spread to many regions and invest in creative development approaches to improve the welfare of local communities (Harefa, 2020). One of the regions in Indonesia that is experiencing rapid economic development in the tourism sector is Yogyakarta.

Based on data, the number of trips by domestic tourists visiting Yogyakarta province has increased every year since 2021. In 2021, the number of tourists was 22,834 thousand, increasing to 25,743 thousand, and in 2023, from January to June, there were 16,117 thousand visitors. One district that has tourism potential is the Gunungkidul district.

Gunungkidul Regency has diverse tourism potential, starting from natural views, caves, beaches, hills, and mountains, as well as the potential for arts and culture and historical heritage, which is diverse and spread across almost 18 sub-districts. This area has experienced an increase in income in the tourism sector of up to 267%. One of the main tourist attractions in Gunungkidul is the Pindul Cave Tourist Area. Pindul Cave is a tourist attraction in the form of a cave located in Bejiharjo Village, Karangmojo District, Gunungkidul Regency. This area, especially the Pindul Cave tourist attraction, is capable of becoming one of the leading destinations for visitors in Gunungkidul Regency.

To improve Pindul cave tourism so that it can become a source of regional income, a comprehensive study is needed to examine the ability of visitors to improve the Pindul cave tourist attraction through a willingness-to-pay (WTP) approach. Several studies have examined the

willingness to pay for tourist attractions in various regions of Indonesia. For example, willingness to pay for the development of Bukit Matang tourism, Banjar Regency, South Kalimantan (Fikri & Rahmini, 2020) and willingness to pay for the development of Arum Jearn tourism in the Serayu River, Banjarnegara district, Central Java (Sudrajad et al., 2021).

This research aims to find out how much visitors are able to pay in an effort to improve the environmental quality of the Pindul Cave tourist in Gunungkidul Regency using the Contingent Valuation Method (CVM). The Contingent Valuation Method is a survey technique method for asking residents about the value or price they give to commodities that do not have a market, such as environmental goods. The purpose of the Contingent Valuation Method approach is to identify the extent to which people are willing to pay (WTP) for a service.

This research has several contributions. First, research on willingness to pay in ecotourism is still rare. Second, this study also analyzes environmental quality improvements in ecotourism, which has not been addressed before.

Literature Review

Hisan et al. (2014) studied the analysis of visitors' willingness to pay tourist attraction levies in the city of Banda Aceh. In this research, it was found that the majority of respondents (80 %), stated that they were willing to pay levies for tourist attractions in Banda Aceh, while the other 20 percent were not willing to pay. The average value of respondents' willingness to pay tourist attraction levies was around Rp. 32,967.5, with the total value of the willingness to pay for all respondents reaching around IDR 825,922,249.9. The results show that gender, education, employment, and average income have a significant effect on respondents' willingness to pay tourist attraction fees. Meanwhile, age does not have a significant influence on respondents' willingness to pay levies. In conclusion, respondents' willingness to pay levies for tourist attractions in Banda Aceh is influenced by gender, age, education, occupation, and average income. The average value of respondents' willingness to pay can be used as a guide in determining the levy price for tourist attractions in Banda Aceh City.

Puspita Sari and Setiartiti (2015) conducted research on willingness to pay for improving the quality of railway services. The main objective of this research is to measure the extent to which people who use long-distance economic train services to Jogja-Jakarta are willing to pay more for these services. Apart from that, this research also aims to identify the factors that influence their decisions in determining the amount of WTP. From the results of this research, it can be concluded that several variables have a positive and significant influence on the willingness to pay for tickets for long-distance economic trains to Jogja-Jakarta. The age, length of education, income, number of dependent children, and purpose of travel have a significant influence on the WTP level of train service users. These findings can be useful for Indonesian train companies to understand customer preferences and satisfaction levels and inform better fare policies. Apart from that, the results of this research can help in planning and developing more efficient and sustainable train services for the people who use train services.

Fikri and Rahmini (2020) investigated willingness to pay for Bukit Matang Kaladan Tourism, Tiwingan Lama Village, Aranio District, Banjar Regency, South Kalimantan. This research uses the willingness to pay (WTP) approach and regression analysis with independent variables consisting of education, income, number of family members, and travel costs. Primary data was obtained through direct interviews with Bukit Matang Kaladan tourists who met certain criteria using a questionnaire. The results of calculations using the WTP method and regression analysis show that the average willingness to pay tourists to visit Matang Kaladan Hill is around IDR 11,260. When there is an increase in quality, the average amount respondents are willing to pay increases by IDR 7,760, so that the average willingness to pay respondents to travel to Matang Kaladan Hill becomes around IDR 19,020. The regression results indicated that education, income, and travel costs positively affect WTP. Meanwhile, the variable number of family members does not have a significant influence in determining willingness to pay. The results of this research provide important insights into the extent to which tourists are willing to pay more for the experience of visiting Matang Kaladan Hill, as well as the factors that influence their decisions. This information can be used for better tourism development and planning at that location.

Medida and Purnomo (2021) explored the willingness to pay of Andemen Tourists in Environmental Conservation Efforts. This research aims to analyze the Willingness to Pay (WTP) value

of tourists in efforts to protect the environment in tourist villages, while identifying the factors that influence their WTP value. This research uses a correlational quantitative method that connects four independent variables. Data collection techniques were carried out through questionnaires. The research results show that the average WTP value that Andeman Boonpring tourists can pay is around IDR 2,593.7. Apart from that, factors that influence WTP are also analyzed, such as variables of tourist origin, income, education, and costs. The variables of tourist origin, income, and costs have a positive effect on WTP. Meanwhile, the education variable has a negative influence on WTP.

Sudrajad et al. (2021)conducted research on the analysis of visitors' willingness to pay (WTP) regarding the development of white water rafting tourism in the Serayu River Watershed. This research uses the Contingent Valuation Method (CVM) and logistic regression analysis. Primary data was collected through a survey of 105 respondents using a multistage sampling technique, while secondary data was obtained from documents originating from departments, agencies, or institutions related to the Serayu Rafting tourist attraction. The results of this research indicate that the economic potential of the Serayu White Water Rafting tourist attraction is considered good, because the majority of respondents, namely around 90.5% of 105 respondents, stated that they were willing to pay more for the development of the tourist attraction. They are willing to pay an additional IDR 10,000 (scenario 1) and IDR 25,000 (scenario 2). The research results also show that the variables of regional origin and income level influence respondents' willingness to pay more. However, the variables gender, age, marital status, and education level do not have a significant influence on respondents' willingness to pay more. The results of this research can be a guide for the development of the Serayu Rafting tourist attraction and provide valuable information about the potential income from tourists who are willing to pay more to improve the facilities and experience at this tourist attraction.

Hipotesis

A level of education plays an important role in its influence on an individual's views on ecological and conservation issues (Gutierriz & Fernandes, 2023). The higher the level of education a person has, the greater the possibility of changes in their mindset regarding the importance of the existence of certain tourist attractions and the benefits that can be obtained from these tourist attractions (Tianyu & Meng, 2020). The level of education can have a positive impact on an individual's willingness to pay and the value they provide as a contribution to the preservation and development of the tourist attraction (Jurado-Rivas & Sánchez-Rivero, 2019). Based on research conducted by Hisan et al. (2014) regarding the analysis of visitors' willingness to pay tourist attraction fees in the City of Banda Aceh, it shows that the education level has a significant effect on respondents' willingness to pay tourist attraction fees. This means that the higher a person's level of education, the higher the likelihood of the individual's willingness to pay for better environmental quality. Based on the education level variable, the first hypothesis of this research is as follows

H_1: The level of education has a positive influence on the willingness to pay to improve the environmental quality of the Pindul Cave tourist attraction

In connection with the theory of human needs put forward by Maslow, it can be seen that the greater an individual's income level, the greater the level of needs they feel. These needs are not only limited to basic aspects such as clothing, food, and shelter but also include broader needs such as entertainment and recreational activities (Cardias & Fandeli, 2021). According to Pertiwi et al. (2022) income plays a very important role in influencing the level of demand for products in the tourism industry. The ability to purchase tourism products and services is influenced by available income, which is closely related to the standard of living and the frequency of travel a person undertakes. In other words, the higher a person's income, the more likely they are to travel according to their wishes. Based on research conducted by Puspita Sari and Setiartiti (2015) on the topic of willingness to pay to improve the quality of Train Services, the income variable has a positive and significant effect on willingness to pay. A person's higher income level will result in an increase in the level of their living needs, including the need for recreation which is included in the tertiary category. The income level variable has a positive influence on the willingness to pay (WTP) and WTP value of visitors. Based on the income level variable, the second hypothesis of this research is as follows

H_2: Income has a positive effect on willingness to pay to improve the environmental quality of the Yogyakarta Pindul Cave tourist attraction.

When recreation costs incurred by visitors increase, their willingness to pay (WTP) also tends to increase. In other words, the higher the recreation costs they pay, the more likely they are willing to pay more for those recreation experiences (Hasfarisham et al., 2024).This in turn can lead to increased income from the recreation or tourism sector. Based on research conducted by (Medida and Purnomo (2021) regarding the Willingness to Pay of Visitors to Andemen in Environmental Conservation Efforts, the recreation cost variable has a positive and significant effect on willingness to pay. Based on the recreation cost variable, the third hypothesis of this research is as follows

H_3:Recreation costs have a positive effect on the willingness to pay to improve the environmental quality of the Yogyakarta Pindul Cave tourist attraction

The frequency of tourist visits can be explained as how often a person or group of people visits a place for the purpose of recreation, self-development, or to understand the attractiveness of the tourist attraction. This reflects the individual's level of interest in the object. The frequency of visits can also be used as an indicator of a person's level of interest in a tourist attraction. If someone frequently visits a tourist attraction over a certain period of time, it shows high interest in that object (Deristani & Hidayat, 2022). The frequency of visits by tourists can have an impact on awareness of the importance of sustainable tourism development. Based on research by Sudrajad et al. (2021) regarding the analysis of Visitors' Willingness to Pay (WTP) on the Development of White Water Rafting Development Tourism in the Serayu Watershed, the variable frequency of visits has a positive and significant effect on willingness to pay. Based on the visit frequency variable, the fourth hypothesis of this research is

H_4:Frequency of visits has a positive effect on willingness to pay to improve the environmental quality of the Yogyakarta Pindul Cave tourist attraction

According to Deristani and Hidayat (2022), the older they are, the more mature a person's level of maturity and strength will be in thinking and working. In terms of public trust, someone who is more mature is trusted more than someone who is less mature. This shows experience and mental maturity. Based on research by Hisan et al. (2014) regarding the analysis of visitors' willingness to pay tourist attraction levies in the city of Banda Aceh, the age variable does not have a significant effect on respondents' willingness to pay levies. Shows that the older a person is, the higher a person's age does not necessarily mean that the individual's WTP is higher for better environmental quality. Based on the age level variable, the fifth hypothesis of this research is

H_5: Age has a positive influence on the willingness to pay to improve the environmental quality of the Yogyakarta Pindul Cave tourist attraction.

As the number of dependents in the household increases, it is possible that the desire to pay more to improve the environmental quality of the Pindul Cave tourist attraction also increases, assuming that other factors are considered unchanged (Durán-Román et al., 2021). Based on research by Puspita Sari and Setiartiti (2015) regarding Willingness to Pay for Improving the Quality of Railway Services, the variable number of dependents has a positive and significant effect on willingness to pay. Based on the variable number of dependents, the sixth hypothesis of this research is

H_6: The number of dependents has a negative influence on the willingness to pay to improve the environmental quality of the Yogyakarta Pindul Cave tourist attraction.

Methods

Sample

The population in this study consisted of visitors to the Pindul Cave. Visitors are an important indicator to determine the level of willingness to pay in efforts to support ecotourism development. As the main driver of demand for ecotourism services, visitors can not only stimulate the local economy but also help provide incentives for better environmental management. Visitors will gain real environmental experience and education, including about the risks and impacts of development. Data collection in this research was conducted by distributing questionnaires to respondents via Google Forms. The objects

of this research are visitors to the Pindul Cave tourist attraction. The minimum number of samples that researchers must obtain is 95. The number of samples is based on the Slovin formula as follows:

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

So we get the number of respondents

$$n = \frac{2.175}{1 + 2.175\ (0.1)^2}$$
$$n = \frac{2.175}{22.75}$$
$$n = 95.604395$$

n is the number of samples, N is the population, and E is the tolerable error rate (10%). 95 respondents filled out the questionnaire with a distribution period of approximately 2 months.

Method

To analyze the willingness to pay of visitors to the Pindul Cave tourist attraction, it can be formulated as follows (Cardias & Fandeli, 2021):

Willingness to pay (WTP) = *f* (Edu, Inc, Cost, Freq, Age, Dep)

Then this function is expressed in the form of a relationship between willingness to pay (WTP) with the education level, income, recreation costs, frequency of visits, age, and number of dependents. The WTP equation can be written as follows (Susilowati et al., 2020):

$$WTP_i = \beta_0 + \beta_1 Educ_i + \beta_2 Inc_i + \beta_3 Cost_i + \beta_4 Freq_i + \beta_5 Age_i + \beta_6 Dep_i + e_i \quad (2)$$

Where WTP is Willingness to Pay, Edu is Education Level, Inc is Income, cost is Total Recreation Costs for Pindul Cave Tourism, Freq is Frequency of Visits, Age is Age and Dep is Number of Dependents

The equation model above is a logistic regression equation. Logistic regression is a non-linear regression where the relationship between the response variable and the predictor variables is not in the form of a straight line. Logistic regression is used as a method to analyze the relationship where the response variable is in binary form (0 and 1) with the predictor variable. This research uses the Contingent Valuation Method, which is a direct survey approach that asks visitors questions about how willing they are to pay Willingness to Pay to preserve the environment in Pindul Cave (Hasballah et al., 2021). The Contingent Valuation Method is an effective way to value an item that is not found on the market. In this method, we can determine the maximum level of willingness to pay from respondents, and this provides clearer information about the value of the goods to those who will benefit (Pertiwi et al., 2022). Then, the total Willingness To Pay scores from all respondents are added up and divided by the number of respondents to get an average score. The estimated average value of willingness to pay is formulated as follows:

$$EWTP = \frac{\sum_{i=1}^{n} WI}{n} \quad (3)$$

EWTP is the estimated average WTP', Wi is the i-th WTP value, n is the number of respondents, and i is the i-th respondent who is willing to pay (i=1,2...n).

This EWTP value is used to determine respondents' willingness to pay using dichotomous choice. The value of the dummy variable if WTP is 1, WTP is the same as EWTP and if WTP is 0, WTP is not the same as EWTP.

Logistic regression is a statistical method that explores the pattern of mathematical relationships between a nominal or ordinal dependent variable (y) and one or more independent variables (x). The main difference with the linear regression model lies in the type of variable used as a response variable. In logistic regression, the response variable is a binary or dichotomous variable, while in linear regression, the response variable must be at least an interval scale. Other differences also include the choice of parametric models and the assumptions underlying these two models. However, the basic principles in estimating parameters used in logistic regression analysis are similar to linear regression analysis.

The logit regression analysis model was chosen to see the chances of respondents being willing to pay or not for environmental improvements at the Goa Pindul tourist attraction where there are several variables that are thought to influence it. The form of the logistics model that will be used is:

$$L_i = \beta_0 + \beta_1 Educ_i + \beta_2 Inc_i + \beta_3 Cost_i + \beta_4 Freq_i + \beta_5 Age_i + \beta_6 Dep_i + e_i \quad (4)$$

Li is the willingness of visitors who want to pay more for the development of the Pindul Cave tourist attraction where L=1 if they are willing to pay and L=0 if they are not willing to pay, Educ is the level of education, Inc is income level, Cost is recreation cost, Freq is the frequency of visits, Age is the age of visitors, Dep is the number of dependents.

Variable measurement

Willingness to Pay (WTP) is the maximum amount of money that a person is willing to pay or sacrifice to obtain positive benefits or avoid negative impacts, such as pollution or environmental damage (Damanik, 2019). It reflects the extent to which a person is willing to support or participate in efforts to maintain or improve environmental quality or support a particular cause. WTP is often used in environmental economics and economic valuation to measure the economic value of environmental aspects that are difficult to measure in other ways.

Education Level (EDU) is a variable that measures how much education the respondent had completed at the time this research was conducted. This final level of education can include educational levels such as elementary school, middle school, high school, or college (bachelor's or master's degree). This level of education is measured by calculating the number of years that have been completed in formal education. Income (INC) in this study is the average per capita income in 1 month received by respondents who have worked and have income in the family. For students, their income level was the living cost they received from their parents per month. Recreation costs (cost) are all costs incurred by visitors to finance their tourism activities which include transportation costs, consumption costs during the visit, documentation costs, lodging (if staying overnight), and other costs incurred while participating in activities at Pindul Cave. Visit frequency (Freq) is how often visitors visit the tourist attraction, whether staying overnight or not, calculated based on the number of times they visit the Yogyakarta Pindul Cave tourist attraction. This age is the year olds of respondents and is measured in years. The number of dependents (Dep) is the number of family members living in the same house who do not have a job and do not earn an income, and their living expenses are borne by household members who are already working and have an income.

Results and Discussion

Respondent Characteristics

In this study, there are two main components, namely the first part which contains data analysis about the characteristics of respondents, and the second part which contains analysis of the variables to be tested. Table 1 presents the characteristics of respondents based on age categories. The largest number of respondents were in the 21-25 year age (35.79%), followed by 26-30 year olds (21.05%), then at the 36-40 age (12.63%), at 41-45 (12.63%), at the 16-20 year olds (8.42%) and then 31-35 year olds (6.32%). The lowest percentage was respondents with an age range of 51-55 years (1.05%). These findings show that the majority of Pindul Cave tour visitors are young people aged between 20-30 years.

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Table 1. Visitors by age

Age	Number	%
16 - 20	8	8.42%
21 - 25	34	35.79%
26 - 30	20	21.05%
31 - 35	6	6.32%
36 - 40	12	12.63%
41 - 45	12	12.63%
46 - 50	2	2.11%
51 - 55	1	1.05%
Total	95	100.00%

Source: Processed Primary Data

Table 2 presents the characteristics of respondents based on gender. The number of males was 65 (68.42%), while there were 30 female respondents (31.58%). This indicates more male visitors to Pindul Cave tourism than females.

Table 2. Visitors by Gender

Gender	Number	%
Male	65	68.42%
Female	30	31.58%
Total	95	100.00%

Source: Processed Primary Data

Table 3 presents the characteristics of respondents based on education level. The highest level of education is a Bachelor's degree with 46 people (48.42%), followed by high school with 45 people (47.37%). The lowest education level is junior high school education (4.21%).

Table 3. Visitors by education level

Education level	Number	%
Junior high school	4	4.21%
High school	45	47.37%
Undergraduate	46	48.42%
Total	95	100.00%

Source: Processed Primary Data

Table 4 displays the characteristics of respondents based on marital status. The findings show that the number of unmarried respondents is 42 people (44.21%). Meanwhile, the remaining 53 people were married (55.79%). Accordingly, we can conclude that most of the visitors to Pindul Cave are married.

Table 4. Visitors by marital status

Marital status	Number	%
Single	42	44.21%
Married	53	55.79%
Total	95	100.00%

Source: Processed Primary Data

The characteristics of respondents based on monthly income are presented in Table 5. Characteristics of respondents who have an income below Rp. 1,500,000 and Rp. 3,500,000 – Rp. 4,500,000 is 14 people (14.89%). Furthermore, respondents who have an income of Rp. 1,500,000 – Rp. 2,500,000 and Rp. 2,500,000 – Rp. 3,500,000 is 24 people (25.53%). Meanwhile, 18 respondents (19.15%) had income greater than Rp. 4,500,000.

Table 5. Visitors by Income

Monthly Income	Number	%
< Rp. 1,5000,000	14	14.89%
Rp. 1,500,000 - Rp. 2,500,000	24	25.53%
Rp. 2,500,000 - Rp. 3,500,000	24	25.53%
Rp. 3,500,000 - Rp. 4,500,000	14	14.89%
> Rp. 4,500,000	18	19.15%
Total	94	100.00%

Source: Processed Primary Data

Table 6 displays the characteristics of respondents based on the number of dependents. 50 visitors (52.63%) had no dependents. Then as many as 19 visitors (20.00%) had 1 dependent. Furthermore, 12 people (12.63%) had 2 dependents, 9 respondents (9.47%) had 3 dependents and 5 visitors (5.26%) had 4 dependents.

Table 6. Visitors by the number of dependent

Number of dependent	Number	%
0	50	52.63%
1	19	20.00%
2	12	12.63%
3	9	9.47%
4	5	5.26%
Total	95	100.00%

Source: Processed Primary Data

Tabel 7 menyajikan frekuensi kunjungan. Responden yang berkunjung ke objek wisata sebanyak 1 kali sebesar 38.95% atau 37 orang. Selanjutnya, responden yang berkunjung ke objek wisata sebanyak 2 kali sebesar 27.37% atau 26 orang. Responden yang berkunjung ke objek wisata sebanyak 3 kali sebesar 24.21% atau 23 orang, lalu responden yang berkunjung ke objek wisata sebanyak 4 kali sebesar 8.42% atau 8 orang dan responden yang berkunjung sebanyak >5 kali sebesar 1.05% atau 1 orang.

Table 7 displays the frequency of visits. Respondents who visited tourist destinations once were 37 visitors (38.95%). Furthermore, respondents who visited tourist attractions twice amounted to 26 people (27.37%). Respondents who visited tourist attractions 3 times were 23 people (24.21%), and then respondents who visited tourist attractions 4 times were 8 visitors (8.42%) and respondents who visited more than 5 times were 1 person (1.05%)

Tabel 7. Visitor by the frequency of visits

Frequency of visits	Number	%
1	37	38.95%
2	26	27.37%
3	23	24.21%
4	8	8.42%
>5	1	1.05%
Total	95	100.00%

Source: Processed Primary Data

Table 8 displays the willingness to pay for environmental preservation at the Pindul Cave tourist attraction. Analysis of willingness to pay for environmental preservation at tourist attractions is an effort to assess the extent to which visitors are willing to pay entrance fees as a contribution to improving and preserving the environment at that attraction. In this case, the fee determined for the WTP entry fee for tourist attractions is IDR. 10,000. The results of interviews with 95 respondents revealed that 77 respondents (81.05%) were willing to pay an entrance ticket levy of Rp. 10,000. They support this initiative because they see it as a positive step to maintain the quality of the environment around tourist attractions. They also consider that these payments are not a significant problem because they aim to improve facilities and maintain important environmental qualities. On the other hand, 18 respondents (18.95%) were not willing to pay a levy of Rp. 10,000. Their reason is that they think this amount is too high, especially if there are additional costs that must be paid to enjoy rides or other services at tourist attractions.

Table 8. Willingness To Pay

WTP	Number	%
Not willing	18	18.95%
Willing	77	81.05%
Total	95	100.00%

Source: Processed Primary Data

Logistic Regression

Logit regression analysis was used to determine the influence of education, income, recreation costs, frequency of visits, age, and number of dependents on the willingness to pay in Pindul Cave. Table 9 displays the logit regression results.

Table 9. Logistic regression

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-9.431046	4.668909	-2.019968	0.02170
EDUCATION	0.537134	0.322478	1.665644	0.04790
INCOME	0.000000	0.000001	0.553134	0.29010
COST	0.000031	0.000012	2.468270	0.00680
FREQUENCY	1.375175	0.847593	1.622448	0.05235
AGE	-0.080665	0.117313	-0.687606	0.24585
Number of dependent	-1.422901	0.648018	-2.195775	0.01405
McFadden R-squared	0.609612			
LR statistic	56.22893			
Prob (LR statistic)	0.00000			

Source: Processed Primary Data

McFadden R-Squared of 0.609612 shows that the variable Willingness To Pay for the Pindul Cave tourist attraction is influenced by the variables Education, income, recreation costs, frequency of visits, age, and number of dependents to the Pindul Cave tourist attraction by 60.96% and the remaining 39.04% is influenced by other variables. The LR statistical test shows that Ho is rejected so that the model is feasible, meaning that all independent variables consisting of education, income, recreation costs, frequency of visits, age, and number of dependents together can explain the willingness to pay to the Pindul Cave tourist attraction.

Hypothesis testing shows that education has a positive effect on WTP at α=5%. The income does not affect WTP. The visitor recreation cost has a positive impact on WTP at α=1%. The frequency of visits has a positive effect on WTP at α=10%. The age has no impact on WTP. The number of dependents has a negative influence on WTP at α=5%.

The classification determination test is used to predict the opportunity for willingness to pay and to determine the determination of the logit model in environmental conservation efforts at the Pindul Cave tourist attraction. Table 10 presents a classification determination test to predict whether respondents are willing or unwilling to pay willingness to pay to improve environmental quality at the Pindul Cave tourist attraction. In this analysis, there are two results, namely respondents who are predicted to be willing to pay WTP for environmental improvements are 77 respondents, while respondents who are predicted not to be willing to pay WTP are 18 respondents.

The results of this analysis show that the classification model used can classify observations with a certainty level of 94%. This means that around 94% of respondents have been classified correctly by the logistic model in identifying whether they are willing or not willing to pay WTP for environmental quality improvements at the Pindul Cave tourist attraction. This illustrates the level of accuracy of the model in predicting respondents' decisions regarding WTP.

Table 10. Classification Determination Test

		Observed	Predicted		
			WTP		Percentage Correct
			Not willing	Willing	
Step 1	WTP	Not willing	13	5	72.22
		Willing	1	76	98.70
	Overall Percentage				93.68

Source: Processed Primary Data

According to the results of hypothesis testing, it shows that the education level variable is proven to have a positive influence on the willingness to pay variable. This means that if the level of education is high, public awareness of environmental conservation will increase and environmental damage caused by human activities can be minimized. People tend to care more about the environment of tourist attractions so that their beauty is maintained. This is in line with research conducted by Puspita Sari and Setiartiti (2015) entitled "Willingness to Pay for Improving the Quality of Railway Services to which education has a significant positive effect on willingness to pay.

According to the results of the hypothesis test, it is verified that income does not have a significant influence on willingness to pay. This means that if the average monthly income increases,

there will be no influence on willingness to pay. This is in line with research conducted by Hisan et al. (2014) regarding analysis of visitors' willingness to pay tourist attraction levies in Banda City.

According to the results of hypothesis testing, recreation costs are demonstrated to have a positive influence on willingness to pay. This means that if the recreation costs incurred are higher, the public's willingness to pay will be higher. This is in line with research conducted by Medida and Purnomo (2021) regarding the Willingness to Pay of Visitors to the Boonpring Islands in Environmental Conservation Efforts.

According to the results of the hypothesis test, the visit frequency variable is positively associated with the willingness to pay variable. This means that if the frequency of visits is high, the higher the willingness to pay for improving the tourist environment. When visitors visit more than once, it means they know the advantages and disadvantages of the Pindul Cave tourist attraction, and the higher the possibility of visitors contributing to efforts to improve the environmental quality of the tourist attraction. This is in line with research conducted by Sanjaya and Saptutyningsih (2019) regarding Factors that Influence the Willingness to Pay of Kiluan Bay Tourism Visitors Using the Contingent Valuation Method (CVM)

According to the results of the hypothesis test, age does not have a significant effect on the willingness-to-pay variable. This means that every additional age will reduce the value of willingness to pay. It is possible that as people get older, they become less aware of the need to pay more to improve the environmental quality of a tourist attraction. This is in line with research conducted by Sudrajad et al. (2021) concerning the analysis of visitors' willingness to pay (WTP) for the development of white water rafting tourism in river watersheds

According to the results of the hypothesis test, the number of dependent variables is proven to have a negative influence on the willingness to pay variable. This means that the greater the number of family dependents, the greater the likelihood of willingness to pay. This is in line with research conducted by Fikri and Rahmini (2020) regarding Analysis of Willingness to Pay in Bukit Matang Kaladan Tourism, Tiwingan Lama Village, Aranio District, Banjar Regency, South Kalimantan.

Conclusion and Recommendation

Based on the analysis and discussion of the willingness to pay of Pindul Cave tourist visitors in Gunungkidul Regency, several important findings emerge. First, the desire to pay is 0.810526, which indicates that 81.05% of visitors are willing to improve the environmental quality of the Pindul Cave tourist attraction. Among the 95 visitors, 77 are eager to pay Rp. 10,000 to improve the ecological quality of Pindul Cave, while the rest were not willing to pay. This means that it is dominated by respondents who are willing to pay to improve environmental quality. Second, based on logistic regression, there are several factors that influence willingness to pay to improve ecological quality in Pindul Cave. The Education level, recreation costs, and frequency of visits have a positive influence on willingness to pay, while the number of dependents has a negative influence on willingness to pay.

These findings are important information for managing the Pindul Cave tourist attraction. First, education level positively influences willingness to pay to improve the environmental quality of tourist attractions. This can be used as input by tourist attraction managers to increase the facilities provided to visitors with higher levels of education. These additional facilities not only allow visitors to enjoy the beauty of the tourist attraction but also increase their knowledge.

Second, recreation costs positively affect the willingness to pay to improve the environmental quality of tourist attractions. This can be used as input by tourist attraction managers to improve the quality of facilities provided to visitors with high recreation costs, such as large parking areas, clean toilet facilities, and rubbish boxes on various sides, so visitors do not have difficulty disposing of rubbish. In addition, some zones can be created, such as food and souvenir zones. With so many facilities, visitors who pay high recreation fees will be satisfied with the variety available, so they will be willing to pay them.

Third, the frequency of visits positively influences willingness to pay to improve the environmental quality of tourist attractions. With a high level of visit frequency, it will yield a higher willingness-to-pay value. With intensive promotion, tourist managers can introduce the natural and cultural potential of tourist attractions, so that the wider community is interested in visiting them. It is expected that increasing the frequency of visits by visitors will increase the local community's income.

This study has several weaknesses. First, it was conducted in 2023, which does not reflect current conditions. Second, it focused on the willingness to pay for environmental improvements at Pindul Cave. Therefore, further research needs to analyze the facility aspect to improve the comfort of ecotourism at Pindul Cave.

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