DETERMINATION OF TEBING KERATON RECREATION DEMAND FUNCTIONS WITH *TRAVEL COST METHOD*

Deni Rusmaya*, Astri Widiastuti Hasbiah, Tsabit Walad al Wahad

Departement of Environmental Engineering, Universitas Pasundan, Indonesia

Abstract

Forest recreation services as additional products that are *intangible*. It can not be quantified because it does not have a price on the normal market system. It underlies a study to determine the economic value of recreation, with case studies Tebing Keraton using the *Individual Travel Cost Method*. Analysis of data obtained from questionnaires using data processing equipment SPSS version 21 with multiple linear regression method to get the Tebing Keraton recreation demand functions. The variables that influence the number of visits are travel cost, total income, age, mileage, and gender. Coefficient values of variables determine the trend in increasing or decreasing the number of tourist visits. In this study, the demand functions divided into two recreational functions for students/scholar and for working people considering total income per month category. Based on the regression results, demand functions for students/scholar, is $Y=-2.179–0.0000347X_1+0.286X_2+0.159X_3-0.0000794X_4-0.267X_5$, and for working people is $Y=1.994–0.00000164X_1+0.53X_2-0.32X_3-0.003X_4-0.334X_5$. The regression result obtained a coefficient of determination (R^2) that the percentage of the diversity of demand number of visits to Tebing Keraton which can be explained by the independent variables in the model. R^2 value of model for students/scholar is 67.1%, which is more than 0.5, showing the moderate accuracy. While for working people, the value of R^2 is 48.9%, which is in the range of 0.31 – 0.5, indicate the weak accuracy.

Keywords: *multiple linear regression, recreation demand functions, Tebing Keraton*

Introduction

Forests are one of the natural resources that have tangible benefits such as wood, rattan, latex, etc., and intangible benefits such as recreation, hydrology, education, and so on (Muthmainnah & Tahnur, 2018) (Yulian et al., 2011).

However, forest recreation services as an additional product that is intangible, which cannot be calculated quantitatively because it does not have a price in the standard market system. So, forest recreation services will be neglected, and it is feared that forest functions will be changed to fulfill the development demand.

One of the natural attractions that many visitors are currently visiting is the Tebing Keraton, Bandung, Indonesia as a tourist attraction because of its different natural characteristics and attracts tourists to visit. Therefore, this potential tourist attraction must be preserved.

To maintain the preservation of the Tebing Keraton, a calculation basis is needed with a quantitative assessment of recreational intangible benefits. To calculate the intangible benefits of recreation, natural resource and environmental economists have attempted to

*)Corresponding Author:
E-mail: denirusmaya@gmail.com

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develop an approach that is considered representative, namely the Individual Travel Cost Method, which principally uses travel costs to calculate the value of the demand for recreation of a natural resource that does not have a market price (Jala and Nandagiri, 2015) (Gravitiani, 2010) (Czajkowski et al., 2019) (Wibowo et al., 2021). Other popular method in economic valuation is Contingent Valuation Method (Isyala & Pharmawati, 2019). These methods are strongly depend on visitors opinion (Yustiani et al., 2017). This study aims to get the Tebing Keraton recreation demand functions using travel cost method.

Methodology

Research Location

This research was conducted at the Tebing Keraton tourist attraction located in Ciharegem Puncak Village, Ciburial Village, Bandung, West Java. The economic value of recreational benefits will be calculated using the Individual Travel Cost Method. This method requires data on the characteristics and perceptions of visitors. The data was obtained through interviews with questionnaires. The distribution of the questionnaires was carried out for 2 weeks.

This Tebing Keraton is in the area and management of the Great Forest Park Ir. H. Juanda. Tebing Keraton is located in Kampung Ciharegem Puncak, Ciburial Village, Bandung, West Java.

The natural tourist attraction in the Tebing Keraton area is the result of natural phenomena and the area's development by the manager of the Tebing Keraton. Among them are natural views from the top of a cliff at an altitude of 1300 meters above sea level, a diversity of flora and fauna, and a camping area. This place is also a place to monitor the migration of eagles from Australia to Asia and return.

The current infrastructure at Tebing Keraton includes safety fences, jogging tracks, prayer rooms, toilets, information boards, and monitoring towers for visitor safety. Tebing Keraton can be reached from various roads through Dago Street or through Cikutra Street, Bandung, Indonesia.

Not all types of vehicles can enter up to the main gate. The road conditions from the city center to the location (the main entrance) are not all paved but are now in quite good condition compared to the previous heavily damaged. If using public transportation, City Transportation only reaches Dago Terminal. Then the journey continues by renting a motorbike taxi.

Data Sources

The data collected consists of primary and secondary data.

a. Primary data; obtained using interviews through questionnaires.
b. Secondary Data; obtained from the Tebing Keraton Management, and literature studies

Sampling (respondents) in this study was conducted non-randomly (non-probability sampling), that is, not all research objects have the same opportunity to be selected as respondents (Juanda, 2007). Respondents who were interviewed were visitors to Tebing Keraton aged over 17 years who were considered to be able to communicate well and were willing to be interviewed.

The proportion of visitors is divided into two, namely student visitors and those who are already working. The proportion was determined from the results of interviews with the guards at the Tebing Keraton entrance counter and direct observation of the number of visitors. It was found that the number of student/scholar visitors was slightly larger than the visitors who were working persons.

Respondents were divided into two because the significant difference in socio-economic characteristics, especially the monthly income of

visitors, was feared to interfere with data analysis in statistics because the data were not normally distributed. Determination of the number of samples was calculated using the table of Isaac and Michael. The number of respondents is 270 people from the number of visitors to Tebing Keraton which is in the range of 100,000-150,000 people n a year with an error of 10%, the proportion of the number of samples for student/student visitors is 150 samples and for visitors who are already working 120 samples.

Data Analysis

In this study the method used is the Individual Travel Cost Method. The estimation of the economic value produced by Tebing Keraton is based on the travel cost method (Armadinata & Pharmawati, 2019). Multiple linear regression analysis was used to obtain the variable coefficient of travel costs from the recreation demand function of Tebing Keraton, to calculate consumer surplus as a proxy for the value of WTP (Willingness to Pay) for recreation locations.

Processing the request function using statistical software, namely SPSS version 21. This tool gives statistical and calculation support to such collected data (Syaleh, 2020). The steps for processing data into a request function in SPSS 21 as follows:

1. Preparing data on the dependent and independent variables in this study the dependent variable is the frequency of visits and the independent variables are travel costs (X_1), total income (X_2), age (X_3), distance traveled (X_4), and gender (X_5).
2. In the total income and gender variables, a dummy variable is used, the dummy variable is a variable that is used to replace non-numeric variables such as the total income variable, although the total income data is in the form of numbers but the total income data is in the form of an uncertain value range, so a dummy variable is made. i.e., if the total income of visitors in the range of Rp. < 2,500,000 then the input data to SPSS becomes 1 and the greater the income, the larger the dummy variable is made up to 5, because the choice of income range in the questionnaire there are 5 choices. Then for gender, the data in the model is a dummy variable where number 1 indicates that the respondent is male, while number 2 indicates that the respondent is female.
3. After inputting the data, the next step is to carry out the analysis procedure as follows:
   - Click Analyze > Click Regression: select Linear.
   - Move the Y variable in the Dependent column > then move the variables X_1, X_2, X_3, X_4, and X_5 to the Independent column.
   - Select Statistics: In the Regression Coefficient option select Estimate, Model Fit, and Descriptive. press Continue.
   - Click Plots to create a Graph > Produce All Partial Plot > Continue.
   - Click OK.

The recreational demand function that will be formed using the multiple linear regression model are:

$$\boldsymbol{Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \varepsilon} \quad (1)$$

Where Y is number of visits to the Tebing Keraton location in the past year or in the year the research was conducted (frequency of visits per year), X_1 is individual travel costs to the Tebing Keraton location (IDR/person), X_2 is Total income (IDR/month), X_3 is age of respondent (years), X_4 is distance from residence to Tebing Keraton (Km), X_5 is gender type (1

for male, 2 for female), b_0 constant, b_1-b_5 regression coefficient, ε is error.

To obtain the recreational demand function, a normality test must be carried out to find out the variable data in the Tebing Keraton demand function model is normally distributed. Then it can be seen on the normal graph plot or with the Kolmogorov-Smirnov normality test, from the output data processing using SPSS.

In the graph of the demand function plot of the Tebing Keraton if it is seen that the points follow and approach the diagonal line, it can be concluded that the data is normally distributed. The normality test based on the graph causes a lot of differences in perception. Therefore, a normality test was carried out with Kolmogorov-Smirnov on SPSS 21.

To see if the data is normally distributed is to look at the value of Sig. on the Kolmogorov-Smirnov section. If the value of Sig. exceeds the significance level of 0.05 then the data is normally distributed.

The regression results show the coefficient of determination (R^2), namely the percentage of diversity in requests for the number of visits to Tebing Keraton which the independent variables can explain in the model. Henseler (2009) proposed a rule of thumb for acceptable R^2 with 0.75, 0.50, and 0.25 are described as substantial, moderate and weak respectively.

Result and Discussion

The recreation demand function of the Tebing Keraton is divided into two, namely the recreational function for students and for those who are already working due to differences in the benchmarks for monthly income.

The variables used to obtain the demand function model for Tebing Keraton recreation are the dependent variable is the number of visits in one year (Y) then the independent variables used are travel costs (X_1), total income (X_2), age (X_3), distance traveled (X_4), and gender (X_5), the following is an explanation of these variables:

- The average frequency of visits (Y) during the past year was twice, with a minimum frequency of one visit and a maximum of five times a year
- Travel costs (X_1) incurred by student respondents to Tebing Keraton are an average of IDR 57,986.00 per person. The minimum travel cost is IDR 15,000.00 and the maximum travel fee is IDR 250,000. Meanwhile, for respondents who are already working, the average cost of traveling to Tebing Keraton is IDR 133,800 per person. Minimum travel costs are IDR 30,000.00 and maximum travel costs are IDR 935,000.00
- The total average income (X_2) of respondents for students/scholars has an average monthly allowance of IDR 1,000,000 -< Rp. 1,250,000. As for those who are already working, namely the income level of IDR 2,500,000 -< Rp. 3,500,000 per month Based on the analysis, it can be said that Tebing Keraton is a recreational place visited by visitors from the lower middle class.
- The average age (X_3) of student respondents is 20.74 years and for those who have worked the average is 28.1 years.
- Student respondents who visited Tebing Keraton had an average distance (X_4) of 26.2 km and those who were already working an average of 38.9 km.
- Gender (X_5) for all respondents on average male.

The Demand Function for Recreation in Tebing Keraton for Students/Scholars

Before discussing the recreational demand function, a normality test must be carried out to

find out the variable data in the Tebing Keraton demand function model for students with a normal distribution, it can be seen in the normal graph plot in Fig. 1.

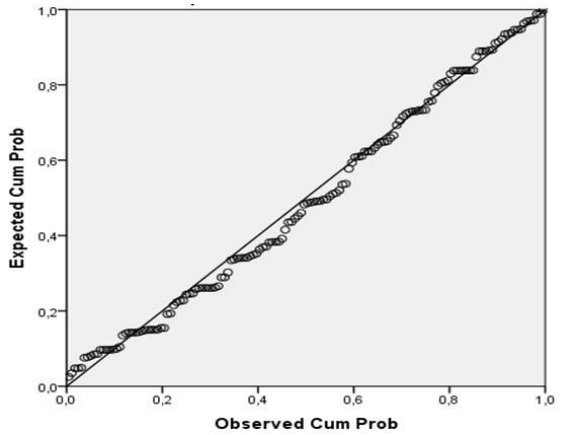

Figure 1. Normal Graph of Demand Function Plot for Student/Scholar

Based on the graph plot of the demand function of the Tebing Keraton for students, it can be seen that the points follow and approach the diagonal line so that it can be concluded that the data is normally distributed

The normality test based on the graph causes a lot of differences in perception. Therefore, a normality test with Kolmogorov-Smirnov was carried out on SPSS 21, as shown in Table 1.

Table 1. Output Normality Test for Student/Scholar Data on SPSS 21

Tests of Normality			
	Kolmogorov Smirnov		
	Statistic	DF	Sig.
Unstandardized residual	0,065	150	0,200

*. This is a lower bound of the true significance
a. Lilliefors Significance Correction

To see if the data is normally distributed is to look at the value of Sig. on the Kolmogorov-Smirnov section. If the value of Sig. exceeds the significance level of 0.05 then the data is normally distributed, it can be seen the value of Sig. Kolmogorov-Smirnov has a value of 0.200 then the student data is normally distributed.

After that, using the previously mentioned variables, the following is the demand function for recreation of the Tebing Keraton for students:

$$\mathbf{Y = -2{,}179 - 0{,}0000347X_1 + 0{,}286X_2 + 0.159X_3 - 0.0000794X_4 - 0.267X_5}$$

From the regression results, the R2 value is 67.1%. This can be interpreted that the independent variables can explain the diversity of requests for the number of visits to Tebing Keraton in the model of 67.1%, and the rest is explained by variables that are not included in the model. The coefficient of determination of 67.1% is in the range > 0.5, which means the accuracy is moderate.

From the demand function equation model above, it can be seen that the variable coefficient of travel costs (b_1) for students is 0.00000347. This travel cost variable coefficient will be used to calculate consumer surplus as a proxy or represent the willingness to pay visitors to Tebing Keraton. So that it can be seen the value of the recreational benefits of the Tebing Keraton. Then it can also be observed that the negative intercept value is -2.179.

The intercept itself is the average value on the Y variable if the value on the X variable is 0 (Novianti et al., 2021). The intercept of -2.179 mathematically states that if the values of X_1 to X_5 are equal to 0 then the value of Y is equal to -2.179; which means that the frequency of visits is -2.179. This is not possible because the frequency of visits may not have a negative value. After all, according to Gujarati (2007), the intercept value is not always meaningful because the range of values for the independent variable often does not include zero as one of the observed values.

The Demand Function for Recreational Tebing Keraton for Workers

The variable data in the Tebing Keraton demand function model for those who have worked with a normal distribution can be seen in the following normal plot graph in Fig. 2.

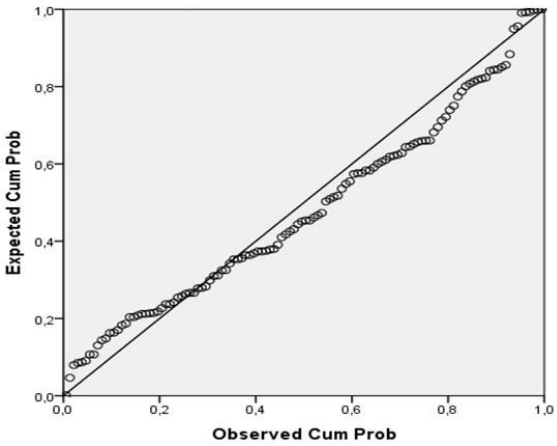

Figure 2. Normal Graph of the Plot of the Demand Function for Workers

Based on the graph plot of the demand function of Tebing Keraton for those who are already working, it can be seen that the points follow and approach the diagonal line so that it can be concluded that the data is normally distributed.

The normality test based on the graph causes a lot of differences in perception. Therefore, a normality test was carried out with Kolmogorov-Smirnov on SPSS 21 by selecting the normality test output as shown in the Table 2.

Tabel 2. Output Normality Test for worker Data on SPSS 21

Tests of Normality			
	Kolmogorov Smirnov		
	Statistic	DF	Sig.
Unstandardized residual	0,103	120	0,186*

*. This is a lower bound of the true significance

a. Lilliefors Significance Correction

To see if the data is normally distributed is to look at the value of Sig. on the Kolmogorov-Smirnov section. If the value of Sig. exceeds the significance level of 0.05 then the data is normally distributed, it can be seen the value of Sig. Kolmogorov-Smirnov has a value of 0.186, so the worker data is normally distributed. Furthermore, using the previously mentioned variables, the following is the demand function for the recreation of Tebing Keraton for those who are already working:

$$\mathbf{Y = 1.994 - 0.00000164X_1 + 0.53X_2 - 0.32X3 - 0.003X_4 - 0.334X_5}$$

In the function, it can be seen that the variable coefficient of travel costs (b_1) for those who are already working is 0.00000164. This travel cost variable coefficient will be used to calculate consumer surplus as a proxy or represent the willingness to pay visitors to Tebing Keraton. So that it can be seen the value of the recreational benefits of the Tebing Keraton.

From the regression results, the R^2 value is 48.9%. This can be interpreted that the independent variables can explain the diversity of requests for the number of visits to Tebing Keraton in the model of 48.9% and the rest is explained by variables that are not included in the model. The value of the 48.9% coefficient of determination is in the range of 0.31 - 0.5, which means that the accuracy is weak.

Conclusion

The distribution of data in the two function models is normally distributed. After testing the normality of the data through the normal graph plot and the Kolmogorov-Smirnov test.

The recreational demand function in this study has met the determination coefficient. In the recreational demand function model for R^2 students it is 67.1% and in the determination, it is in the range > 0.5, which is moderate accuracy. Meanwhile, for those who have worked, R^2 is 48.9%, the coefficient of

determination is in the range of 0.31 - 0.5, which is weak accuracy.

The variable coefficient of travel costs (b_1) for students is 0.00000347 and the variable coefficient of travel costs (b_1) for those who are already working is 0.00000164. This travel cost variable coefficient will be used to calculate consumer surplus as a proxy or represent the willingness to pay visitors to Tebing Keraton.

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