The Economic Value Zone of Semarang Zoo Using Travel Cost and Contingent Valuation Method

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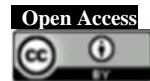[123]*Departement of Geodesy Engineering Diponegoro University, Semarang*
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Abstract

Semarang City is one of the cities in Central Java which has a lot of potential and tourist attractions that can be developed further. The city offers diverse destinations, including Semarang Zoo. In 2007, the Municipal Government of Semarang relocated the zoo from Tinjomoyo Zoo to a new site in the Mangkang area and renamed it Semarang Zoo. Currently, Semarang Zoo is a man-made tourist attraction. The presence of these tourist areas has a substantial impact on the local economy, benefiting the surrounding communities. To assess the post-relocation development of tourist areas, an analysis of the economic value zones was conducted using the Travel Cost Method (TCM) and the Contingent Valuation Method (CVM) to determine the total economic value of the tourist areas. The Hedonic Pricing Method (HPM) was employed to gauge tourism potential based on visitor preferences. The Gravity Model was also utilized to measure the attractiveness of both tourist areas. The sample sizes for Semarang Zoo were 110 for TCM, 105 for CVM, and 110 for HPM. The research findings revealed that Semarang Zoo has a total economic value of IDR 245,895,813,400 and the highest hedonic value of 3.050. The calculated hedonic value suggests a preference value of 3, indicating an average level of preference. Based on the calculation of spatial interactions, it shows that the biggest attractions of the Semarang Zoo are Semarang City and Kendal City.

Keywords: Total Economic Value, Gravity Model, Hedonic Value, Semarang Zoo, Spatial Interaction

1. Introduction

Based on the Law of the Republic of Indonesia Number 10 of 2009 concerning Tourism, tourism functions to meet the physical, spiritual and intellectual needs of all tourists through recreation and travel, as well as to increase state revenues in order to achieve people's welfare. The city of Semarang has a variety of tourist destinations, such as the Semarang Zoo which has man-made tourist attractions (Idris, 2022). According to Situmorang & Suryawan (2018), the tourism sector is a potential sector for development.

Semarang Zoo is one of the favorite tourist attractions in the Semarang City. Based on Hamaz (2018), the history of the Wildlife Park, or what is officially called the Tinjomoyo Margaraya Park (Bonbin Tinjomoyo), was a relocation from the Tegal Wareng Zoo in 1985. However, in 2007, all the animals were moved to a new location in the Mangkang, Semarang. Semarang City Government then decided to move the location of the zoo with this new location, and Tinjomoyo Zoo changed its name to Mangkang Semarang Zoo (Semarang

Zoo). Beside that a recreation area, this zoo is expected to be a place for conservation and education. The management provides various kinds of animal attractions and children's games for support tourism activities. This attraction is supported by the transportation, services and supporting facilities so that Semarang Zoo is attractive for tourists to visit.

Semarang Zoo has an economic effect on the surrounding areas, with many traders in the area around Semarang Zoo. Based on research Wibowo (2023), Semarang Zoo has a result assessment 12 and is in the very high category, based on the parameters of attractions, amenities and accessibility with descriptive qualitative methods. The method in the research can be used as a basis for assessing tourist attractions, but the obtained results cannot be explained quantitatively. Based on the deficiencies of this method, so in this research was carried out an assessment of the Semarang Zoo using the Travel Cost and Contingent Valuation Method (CVM) methods. This method will produce

an output of regional economic value in rupiah based on physical parameters and the results of interviews by visitors.

Cininta (2016) said that regional economic value is all economic value both direct value and indirect value as well as market value and non-market value in an area and does not include the value of property in the area. The total economic value can be obtained using the Travel Cost Method (TCM) approach which is used to obtain direct use value by using respondent data from visitors and Contingent Valuation Method (CVM) to obtain the existence value of the people who take advantage of tourist locations, such as traders and others. The economic assessment used the TCM approach which is calculated based on the amount of travel costs incurred by visitors in tourist area. Whitehead in Gatot (2019) states that CVM is the only method that can be used to measure economic value for people who do not directly experience changes from a policy.

On the other hand, based on research of Rindika (2020), the hedonic value is calculated by Hedonic Pricing Method (HPM) to find out in detail of the tourist potensial area from the level of visitor preference as an additional analysis of the total economic value and can be used as a consideration for improving existing facilities and sub-tourism. Tourist attractions can attract visitors from various regions, beside from visitors from the Semarang City. The value of tourist attractions in several areas around the Semarang Zoo can be calculated using the Gravity Model method. Newton's gravity model can be used to assess the degree of spatial interaction between two or more regions (Irsyad & Syahnur, 2018).

Based on the problems described previously, in this research will calculate regional economic value in Semarang Zoo, hedonic value based on the distribution of facilities, and also analysis of spatial interactions around the Semarang Zoo area with the Grvaity Model method. The obtained results can be used as a reference in developing Semarang Zoo's tourism potential for tourism managers and related agencies.

2. Material and Methods

2.1 Location of Research

The research is located in Semarang Zoo in Semarang City. Data Collection was carried on September until October 2022 with interviewing respondents, submitting data request to relevant agencies, and toponymy survey. Site of location map can be seen at figure 1.

Figure 1. Location of Research Map

2.2 Tools and Materials of Research

The tools which is used in this research is Microsoft Word, Microsoft Excel, ArcGIS 10.7, IBM SPSS 25, Mobile Topographer, and Maple 17. The materials whis is used in this research is result of interviewing using Travel Cost Method, Contingent Valuation Method, and Hedonic Pricing Method, map of administration Semarang City, population of Semarang City, visitors data and area data of Semarang Zoo, SPOT-7 Imagery, and result of toponymic survey.

2.3 Data Analysis
2.3.1 Total Economic Value

The economic value of an area is all economic values such as direct or indirect use value, as well as optional or optional value, existence value and inheritance value in an area which does not include land value and property value in the assessed area (Ismawati, 2019). The TEV of the area itself is assessed based on non-market factors such as direct use (use value) and indirect use (non-use value). Formulas (1) can be used to calculate TEV as follows.

TEV $= DUV + EV$ ……………………………… (1)
Explanation:
DUV $=$ Direct use value
EV $=$ Existence value

2.3.2 Travel Cost Method

The Travel Cost Method (TCM) is a method that uses travel costs as a substitute for pricing and is one of the first methodologies used by environmental economists to evaluate demand for environmental benefits (Dharmawan, 2016). Based on the 2012 National Land Agency TCM Approach to Calculate Textual Data Processing Exercises, TCM calculations are formulated as equation 2.

$Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + \beta_4 X4 + \beta_5 X5 + \beta_6 X6$
$\qquad \beta_7 X7$……………...................................(2)

Explanation
X1 = presence
X2 = age
X3 = education
X4 = number of families
X5 = income
X6 = benefits

X7 = importance
X8 = conversion
X9 = participation
N = population

2.3.3 Contingent Valuation Method

According to Dharmawan (2016), the Contingent Valuation Method (CVM) is an assessment-based questionnaire approach where the willingness to pay/respondents in terms of certain commodities is obtained directly. The equations used in the CVM approach are shown in equations 3 to 5 based on the Guide to Calculating Textual Data Processing ZNEK Assessments with the CVM Approach by the National Land Agency.

$$\text{WTPcount} = \exp(\beta 0) \, X1^{\beta 1} \, X2^{\beta 2} \, X3^{\beta 3} \, X4^{\beta 4} \, X5^{\beta 5} \, X6^{\beta 6} \, X7^{\beta 7} \, X8^{\beta 8} \, X9^{\beta 9} \, X10^{\beta 10} \ldots\ldots\ldots\ldots(3)$$

$$\text{WTPriil} = \text{WTP min} + (\text{calculated WTP decimal value} \times \textit{range terpilih})\ldots\ldots\ldots\ldots\ldots(4)$$

$$\text{WTP} = \textit{total benefit} = \text{WTP riil} \times N\ldots\ldots\ldots\ldots(5)$$

Information :
X1 = presence
X2 = age
X3 = education
X4 = number of families
X5 = income
X6 = benefits
X7 = importance
X8 = conversion
X9 = participation
X10 = satisfaction
N = population

2.3.4 Hedonic Pricing Method

According to Livia (2020), the hedonic technique is a method used to measure how big a product is desired. The scale for the category used varies depending on the quality range specified so that the number of levels of preference can vary. The most widely used test to measure the level of preference for production is the hedonic test. The value of quality or quality is calculated using hedonic data derived from responses to the given questionnaire. The average quality value interval for each respondent is determined using formula (6) based on (SNI number 01-2346-2006):

$$P((\bar{x}-1{,}96.s/\sqrt{n}))<\mu<(\bar{x}+(1{,}96.s/\sqrt{n}))\ldots\ldots\ldots\ldots(6)$$

Explanation :
$\bar{x}$ = average quality value
s = standard deviation
n = total of panelist
μ = hedonic value

2.3.5 Classical Assumption Test

The three approaches listed below were used to test the classical assumptions in this research.

1. Normality Test
   Djami (2010) states that the purpose of the normality test is to find out whether the distribution in a data set or variable is normally distributed or not. Normality testing can be done using the graphical method or the skewness and kurtosis methods.
2. Multicollinearity Test
   According to Mardiatmoko (2020), multicollinearity is a situation where the independent variables in a regression model have a perfect or close linear relationship. Multicollinearity testing can be done by comparing the simultaneous determination coefficient value with the individual determination coefficient value, or maybe focusing on the Variance inflation factor in the regression model.
3. Heteroscedasticity Test
   Heteroscedasticity is a condition where there is an inequality of variance from the residuals for all observations in the regression model (Mardiatmoko, 2020). Heteroscedasticity testing can be done with the Glesjer test method, Spearman rank, and correlation coefficient testing.

2.3.6 Statistic Test

The statistical test utilized in this research is as follows.

1. Validity Test
   Yusup (2018) says that the accuracy or precision of a measurement instrument is called validity. To test the validity can be used equation 7.

   $$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{N\sum X^2 - (\sum X)^2\}\{N\sum Y^2 - (\sum Y)^2\}}}\ldots\ldots\ldots(7)$$

   Explanation :
   r = description of the correlation of X with the overall Y score
   N = number of respondents
   X = number of item scores
   Y = instrument item value

2. Reliability Test
   According to Yusup (2018), the consistency of a measuring instrument is determined by a reliability test, which determines whether the measuring device is reliable and consistent when repeated. A data is said to be reliable if the measurement results are consistent and have a Cronbach Alpha value of more than 0.70. The reliability test can be carried out using the Alpha Cronbach method as in equation 8.

   $$r_{11}=\left(\frac{k}{k-1}\right)\left(1 - \frac{SD_b{}^2}{SD_t{}^2}\right)\ldots\ldots\ldots\ldots\ldots(8)$$

   Explanation :
   K = total item
   SDb = varians of item
   SDt = varians of total score

2.3.7 Spatial Interaction With Gravity Model

Movement or communication between different areas is referred to as spatial interaction. Economic flows (commodities or trade between regions), information flows, and population mobility flows (migration) can all be used to estimate movement or communication between various regions (Brocker in Irsyad, 2018). Where to measure the strength of interaction between regions can be used equation 9 as follows:

$$Tij = k \frac{m_i{}^\alpha m_j{}^\beta}{r^c{}_{ij}} \dots\dots\dots\dots\dots\dots\dots\dots\dots(9)$$

Explanation :
Tij = spatial interaction of region i and j
mi = push factor
mj = pull factor
rij = distance of i and j
α,β,c = mass coefficient
k = constanta

3. Discussion Result

3.1 Classical Assumption Test

The result of classical assumption test in this research are as follows.

1. Normality Test

Ghozali (2011) emphasized that a residual data can be declared normally distributed if the Zskewness and Zkurtosis values are not more than 1.96. The Zskewness and Zkurtosis values for each method are shown in table 1.

Table 1. Result of Normality Test

Method	*Zskewness*	*Zkurtosis*
TCM	-0,225	0,811
CVM	0,587	-1,091
HPM	1,277	0,884

2. Multicollinearity Test

VIF values for each method are shown in table 2 to table 4.

Table 2. VIF Value of TCM

Variable	Information	Semarang Zoo
X1	Total cost	2,311
X2	Age	1,784
X3	Education	1,602
X4	Income	1,271
X5	Length of visit	1,834
X6	Alternative visit	1,039
X7	Number of group	1,626

Table 3. VIF Value of CVM

Variable	Information	Semarang Zoo
X1	Existence	3,873
X2	Age	1,784
X3	Education	2,122
X4	Number of families	1,268
X5	Income	1,343
X6	Benefit	5,245
X7	Interest	4,103
X8	Conversion	1,89
X9	Participation	2,536
X10	Satisfaction	3,723

Table 4. VIF Value of HPM

Variable	Information	Semarang Zoo
X1	Tourist facility	1,544
X2	Transportation	1,158
X3	Lodging	1,213
X4	Gift center	1,569
X5	Entrance fee	1,388

A regression model is declared have not multicollinearity if it has a Variance Inflation Factor or VIF value of less than 10. Based on that table 2 to 4, it is known that TCM, CVM, and HPM for Semarang Zoo have not multicollinearity because their VIF value is less than 10.

3. Heteroscedasticity Test

A regression model is declared not experiencing heteroscedasticity if the significance value on the independent variable is more than 0.05 and does not form a certain pattern. The results of the heteroscedasticity test on TCM, CVM and HPM Semarang Zoo are shown in Figure 2 and Table 5.

Table 5. Significance Result of Heteroscedasticity Test

Variable	TCM	CVM	HPM
X1	0,679	0,841	0,449
X2	0,356	0,899	0,27
X3	0,692	0,857	0,951
X4	0,718	0,468	0,313
X5	0,193	0,836	0,759
X6	0,847	0,918	
X7	0,929	0,572	
X8		0,110	
X9		0,170	
X10		0,435	

Based on table 5, it is known that significance value of TCM, CVM, and HPM data more than 0,05. So TCM, CVM, and HPM data for Semarang Zoo haven't heteroscedasticity.
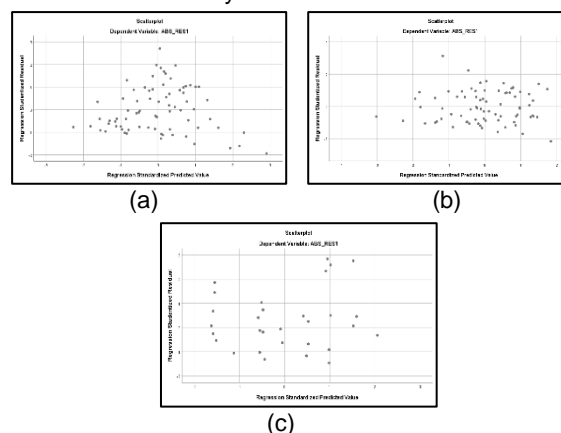

(a)   (b)

(c)

Figure 2. Result of Heteroscedasticity Test TCM (a) CVM (b) and HPM (c) Semarang Zoo

3.2 Statistical Test

The explanation about result of statistical test in this research is as follows.

1. Reliability Test

The result of CVM and HPM validity test are shown in table 6.

Table 6. Result of Reliability Test

Method	Cronbach's Alpha Value	Number of items
CVM Semarang Zoo	0,772	7
HPM Semarang Zoo	0,7	6

A regression model is declared reliable if Cronbach's alpha value is > 0.70. Based on table 6, it is known that cronbach's alpha of CVM and HPM Semarang Zoo is 0.772, and 0.7. All values have exceeded 0.70 so the data is reliable.

2. Validity Test

Table 7 for the Semarang Zoo CVM and Table 8 for the Semarang Zoo HPM each displays the results of the validity test. When R count exceeds R table, a variable is said to be valid. Variables are considered invalid if the opposite condition occurs. In this research, invalid variables have inconsistent data characteristics.

Table 7. The Result of Validity Test of CVM Semarang Zoo

Variabel	Correlated Item-Total Correlation	R Tabel	Description
Willingness to Pay	0,310	0,2242	Valid
Existence	0,629	0,2242	Valid
Benefit	0,719	0,2242	Valid
Interest	0,624	0,2242	Valid
Conversion	0,348	0,2242	Valid
Participation	0,418	0,2242	Valid
Satisfaction	0,551	0,2242	Valid

Table 8. The Result of Validity Test of HPM Semarang Zoo

Variabel	Correlated Item-Total Correlation	R Tabel	Description
Visit Frequency	0,786	0,246	Valid
Facility	0,519	0,246	Valid
Transportation	0,269	0,246	Valid
Lodging	0,419	0,246	Valid
Gift Center	0,334	0,246	Valid
Entrance ticket	0,395	0,246	Valid

Based on table 7, it is known that the valid variable in CVM Semarang Zoo are Willingness to Pay Existence, Benefit, Interest, Conversion, Participation, Satisfaction. Based on table 8 it I known that all variables in the Semarang Zoo HPM are said to be valid.

3.3 Influential Variable Analysis

Influential variable analysis was carried out by conducting a t-test on TCM, CVM and HPM Semarang Zoo tourism data. The results of the t test for each method are shown in tables 8 to table 10.

Table 8. The Result of t Test for TCM Semarang Zoo

Variabel	T stat	T table	Description
Total cost	-6,232	1,99601	Affect
Age	4,521	1,99601	Affect
Education	2,747	1,99601	Affect
Income	0,059	1,99601	No affect
Length of visit	0,594	1,99601	No affect
Alternative visit	0,563	1,99601	No affect
Number of group	3,851	1,99601	Affect

Table 9. The Result of t Test for CVM Semarang Zoo

Variabel	T stat	T table	Description
Existence	4,350	1,99656	Affect
Age	2,640	1,99656	Affect
Education	-1,636	1,99656	No affect
Number of families	0,165	1,99656	No affect
Income	5,046	1,99656	Affect
Benefit	1,756	1,99656	No affect
Interest	1,886	1,99656	No affect
Conversion	-0,218	1,99656	No affect
Participation	-2,790	1,99656	Affect
Satisfaction	0,348	1,99656	No affect

Table 10. The Result of t Test for HPM Semarang Zoo

Variabel	T stat	T table	Description
Tourist facility	2,491	2,00172	Affect
Transportation	4,107	2,00172	Affect
Lodging	5,055	2,00172	Affect
Gift center	1,431	2,00172	No affect
Entrance fee	2,704	2,00172	Affect

Based on table 8, it is known that the variables that affect the frequency of visits to the TCM method at the Semarang Zoo are travel costs, age, education, and the number of groups. Based on table 9, the variables that influence Semarang Zoo's CVM are presence values, age, number of families, and participation values. Based on table 10, it is known that the variable that has no effect on the Semarang Zoo HPM is only the souvenir center.

3.4 Total Economic Value

The total economic value of a tourist area is obtained by adding up the direct use value and existence value. The results of the total economic value of the Semarang Zoo area can be seen in table 11.

Table 11. Total Economic Value

Area	Semarang Zoo
Direct Use Value (IDR)	109.523.342.000
Existence Value (IDR)	136.372.471.400
Total Economic Value (IDR)	245.895.813.400

Based on table 11, it can be seen that the total economic value of Semarang Zoo has a high value. This is because the Semarang Zoo tourist location has easier transportation access. Semarang Zoo also has high direct use value, as Semarang Zoo offers tourists a variety of diverse sub-tours, as well as a number of modern rides suitable for visitors of all ages. In addition, Semarang Zoo has a good general condition of the area. In terms of existence value, Semarang Zoo also has a high score because the distribution of research respondents are beneficiaries who are around the Semarang Zoo area. A map of the total economic value of the Semarang Zoo area can be seen in Figure 3

Figure 3. Map of Semarang Zoo Total Economic Value

3.5 Hedonic Value Analysis

The results of calculating hedonic values use a scoring test with a 95% confidence level from the average results of each respondent. The purpose of this problem is to calculate the average interval of the preference value of each respondent. In Semarang Zoo it can be seen that the value of the hedonic interval for each variable is (2.888, 3.050). It can be concluded that the level of preference or hedonic value for each variable has the smallest value for the Semarang Zoo area of 2.888. It can be concluded that the hedonic level or hedonic value of Semarang Zoo has a hedonic value of 3.0 and can be said to be normal. The value of hedonic intervals in tourist areas is supported by the distribution of various and many utilities around Semarang Zoo with a radius of + 2 km. The display of the utility distribution of the Semarang Zoo can be seen in Figure 4.
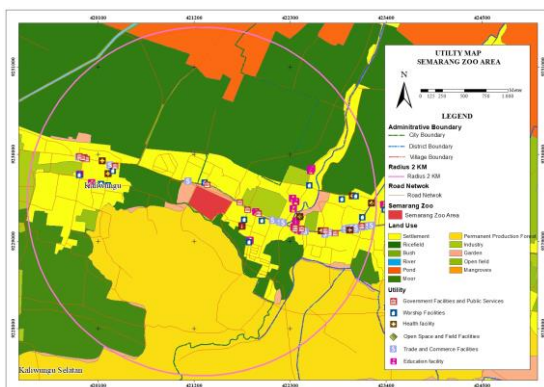

Figure 4. Semarang Zoo Utilities Distribution Map

From the results of the toponymic survey in the Semarang Zoo area, 73 points were taken with

details, namely 13 worship points, 9 health points, 19 trade and commerce points, 1 open space and field point, 17 education points, 14 government and public service points.

3.6 Spatial Interaction with Gravity Model

In this research, spatial interactions are calculated using the gravity model. The interaction between the Semarang Zoo area and the district/city center has diversity and excels in certain areas in tourist areas, this is because it is influenced by the distance to tourist attractions and the population of each district/city. The overall value of Semarang Zoo's spatial interaction is directly proportional to the total economic value, namely the greater the spatial interaction, the greater the total economic value, this can be seen from the total economic value of Semarang Zoo. Table 12 is the magnitude of the spatial interaction with the Semarang Zoo.

Table 12. Result of Regional Spatial Interaction

Region	Spasial Interaction of Semarang Zoo
Demak	63,102
Kudus	12,540
Semarang	1929,803
Kendal	720,064
Kabupaten semarang	129,647
Grobogan	2,640

Based on table 12 it is known that the Semarang City area has the highest spatial interaction value. The lowest spatial interaction value in Semarang Zoo is Grobogan Regency with a value of 2.640. The closest district spatial interaction map display is shown in Figure 5.
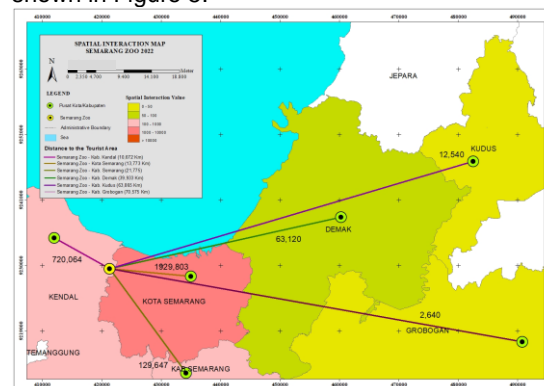

Figure 5. Regional Spatial Interaction Map of Semarang Zoo

4. Conclusion

The following are suggestions that can be given in this study as follows:
1. Based on the assessment and calculation process, the total economic value (TEV) of Semarang Zoo is Rp. 245,895,813,400. This value is obtained from the sum of the direct use value (DUV) and existence value (EV).
2. From the calculation of the hedonic value at Semarang Zoo, it is known that the hedonic value interval for each variable is (2.888, 3.050. The hedonic value of Semarang Zoo is also

supported by the distribution of utilities around the tourist area. From these results it can be seen that visitors have interest in Semarang Zoo is normal.

3. The tourist attraction of Semarang Zoo can be seen from the value of spatial interaction with the largest Semarang Zoo is the visitors from Semarang City and Kendal. This is due to existing facilities, access to public transportation, and the distance traveled and access.

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