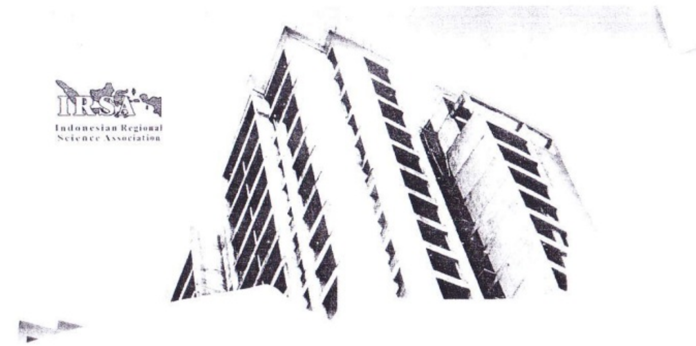
Estimating The Wconomic Value of Mangove Forest in Kulonprogo Yogyakarta Indonesia

by Endah Saptutyningsih Saptutyningsih

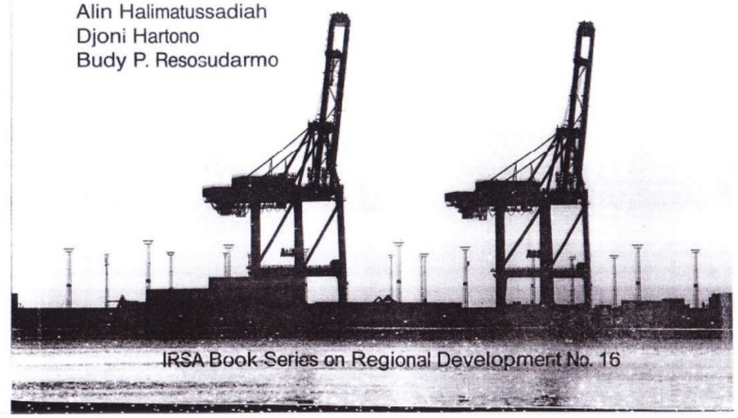
IRSA
Indonesian Regional Science Association



MARITIME INFRASTRUCTURE AND REGIONAL DEVELOPMENT IN INDONESIA

Editors:

Noldy Tuerah
Joy Elly Tulung
Hizkia H. D. Tasik
Alin Halimatussadiah
Djoni Hartono
Budy P. Resosudarmo



IRSA Book Series on Regional Development No. 16

IRSA Book Series on Regional Development No. 16

Maritime Infrastructure and Regional Development in Indonesia

Maritime Infrastructure and Regional Development in Indonesia

Editors:
Noldy Tuerah
Joy Elly Tulung
Hizkia H. D. Tasik
Alin Halimatussadiah
Djoni Hartono
Budy P. Resosudarmo

UB Press

2018

Maritime Infrastructure and Regional Development in Indonesia

Editors:
Noldy Tuerah
Joy Elly Tulung
Hizkia H. D. Tasik
Alin Halimatussadiah
Djuni Hartono
Budy P. Resosudarmo

ISBN:
978-602-432-530-5

Desain Sampul:
Enggal Mukti

Layout:
Tim UB Press

Prepres and Produksi:
Tim UB Press

Penerbit:
UB Press

Redaksi:
Jl. Veteran 10-11 Malang 65145 Indonesia
Gedung INBIS Lt.3
Telp: 0341-5081255, WA. 0822-2823-8999
E-mail: ubpress@gmail.com/ubpress@ub.ac.id
http://www.ubpress.ub.ac.id

Cetakan Pertama, Juli 2018
i-xvii + 358 hlm, 15.5 cm x 23.5 cm

FOREWORD

Technological progress and innovation that naturally comes from human ingenuity has brought an unprecedented increase in mankind's standard of living. Economic growth has increased the per capita income of almost all nations, changing their status from low to high income societies.

This global per capita income increase and convergence between countries has helped poor countries change their status to become middle or even high-income countries, and has contributed to declining inequality between countries. However, over the past three decades, inequality within countries is generally increasing. Societies in most countries are becoming more polarized, creating tension and triggering populism and identity politics.

In September 2015, leaders from all countries met in New York at the UN General Assembly and adopted the 2030 Development Agenda titled "Transforming our world: the 2030 Agenda for Sustainable Development" or Sustainable Development Goals (SDGs) for short. SDGs acknowledges increasing inequality as one of the most important problems faced by all nations.

One strategy to reduce inequality within countries has been improving connectivity among regions in a country, allowing goods, services, humans and knowledge to transfer among these regions to support regional and human development in all parts of the country. One aspect needed to improve connectivity is transportation infrastructure development which has sometimes been challenging for many developing countries.

TABLE OF CONTENTS

Chapter 12
Estimating The Economic Value of Mangrove Forests in Kulon Progo Yogyakarta, Indonesia

Endah Saptutyningsih and Septina Dwi Lestari

INTRODUCTION

Mangrove forest is a form of ecosystem which provides benefits for human life. In terms of ecological values, mangroves may function as food provider for aquatic biota, spawning ground for biota, protecting the area from abrasion, hurricane and tsunami, absorbing waste, preventing an intrusion of sea, and many more. On the other hand, mangroves have also economic values, as all parts of the tree can be utilized not only for edible syrup, but also for batik coloring, for medication, fuel, fishing equipment, paper raw materials, etc. in addition to the firewood it may generate (Zen and Ulfah 2015).

Moreover, mangrove forests have now been popularly known for its ecotourism activities, which in turn have an impact on the socio-economic conditions of the people living in its surroundings. As a case in point, the community around the Kadilangu mangrove forest in Temon Sub-district, Kulon Progo Regency, Yogyakarta can earn income from its mangrove ecotourism with fishponds which does not only offer economic value but also ecologically protects the area from sea water abrasion.

Although mangroves have ecological and economic values, it is also vulnerably prone to damage. Adverse effects are evoked from the ecotourism it has offered, as the number of visitors keeps increasing whereas waste control is very low, causing the mangrove environment to get even dirty and more polluted. In that case, visitors' awareness of the mangrove forests' ecological values must be encouraged under the government's control through strict standard regulations. This measure must be taken to help preserve the mangrove forests.

The natural landscape of mangroves with rivers plying between and through them, provides various recreational opportunities to visitors. These recreational services range from passive indulgence, such as bird watching, and nature and wildlife enjoyment to active participative activities like fishing and boating. Despite the popularity of the mangrove ecosystem as a sport-fishing destination, there is very little information pertaining to the economic contributions generated, either to the local economy or the benefits directly derived by the visitors. The latter is significant given that sport fishing in the rivers plying between the mangrove forests is free due to the open access character of such recreational service.

An important feature of sport fishing recreational opportunities in a mangrove site lies in its uniqueness and site specificity. Recreational utility gained in this site is not similar to the one in other site since each site has its own unique environmental attributes. River flows, water tides and quality of fish areas are varied among mangrove locations. The services cannot be physically transferred to the location of consumers. Each individual consumer would have to travel to the recreational site to obtain the services. Hence, both travel cost and travel time will be incurred to the consumers.

In each case an implicit transaction involving the cost of traveling is incurred in return for access to the site. Different individuals will face different travel costs to the site. These features

of recreational services of mangroves make the study on its economic aspect manageable. Despite its lack of variation in access price, which is needed for econometric estimation of demand functions, the use of travel cost as a proxy of price has overcome this limitation. Hence, we can still obtain the demand function of sport fishing at a mangrove site by adopting the Travel Cost Method (TCM).

Kadilangu Mangrove Forest is one of tourism objects located in Temon Sub-district, Kulon Progo Regency that attracts many local and domestic tourists because of its natural beauty. Because of its natural attractions, Kadilangu Mangrove Forest is also utilized as a mangrove conservation and educational-based tourism.

Unlike in other goods, the value of public goods, such as recreation resources and protected natural areas are typically not directly captured through any price mechanism. This in effect means economic values are not determined by the exchange of goods and services in organized market through price mechanism, the interaction between the forces of demand and supply as well as market mix. Despite, their economic value is considerable as people are willing to give up their scarce resources including time and money to use such areas and ensure they are continually available.

Freeman (2003) classifies the non-market economic values provided by the public goods into use and non-use components. Use values are the benefits which accrue to visitors who use the national park facilities and enjoy the amenities. This is the most likely significant non-market value of major urban recreation sites. According to Loomis (1993) and FAO (1995), it is sub-divided into direct use and onsite values, indirect use values and downstream benefits, and option values. Option value according to Loomis (1993) and Bishop (1999) is a future value which arises from the desire of an individual to retain the option to undertake future visit to a site which possesses certain desirable qualities.

The search to find the means of estimating the value and the relationships that exist between this value and the factors that determine it have yielded two categories of approaches: the direct and indirect approaches of the revealed and the stated preference in that order. The Travel Cost Method (TCM) belongs to the revealed preference approach which utilizes the complementarities of market and non-market goods and studies people's behaviors to determine their preferences. The direct method which involves the stated preference approach attempts to gauge value by asking people directly for their idea of the worth of an asset. This involves the Contingent Valuation Method (CVM) which is based on the survey on how much respondents would be willing to pay to preserve (or create) a non-market asset.

Empirical valuations of mangrove forest for recreation are based on the welfare concepts of environmental economics. The fundamental assumption here is that the neo-classical concept of economic value based on utility maximization behavior can be extended to non-market goods. An individual or household demands greater or lesser quantity of an environmental amenity if a variable price of the amenity exists. This implies for a normal good, the higher the price the lower the demand and vice-versa.

The familiar concept of consumer surplus can be used to assign economic value if shadow prices for the amenity can be estimated and a demand curve traced out. Koutsayannies (1979) defines consumer surplus as the difference between the amount of money that a consumer actually pays to buy a certain quantity of a commodity and the amount he would be willing to pay for the commodity rather than do without it. This in effect implies subtracting what consumers pay from the maximum they would be willing to pay. The value of the surplus is estimated using the area under the demand curve above the price paid. The Travel Cost Method specification for this demand curve is modeled as the

expected on-day site demand equation with the dependent variable as the number of days one visitor stays in the site per trip.

This study estimates the value of tourism at the Mangrove forest area in Kadilangu, Kulon Progo Yogyakarta. This tourist destination is ecotourism site which is the most visited among other mangrove forest sites in Kulon Progo Yogyakarta. The first method implemented to estimate the use-value is the Travel Cost Method (TCM). By applying TCM, we get the information on visitors' willingness to pay and the price elasticity of demand estimates. The estimated price and income elasticity coefficients for the Kadilangu Mangrove Forest area in Kulon Progo can provide important information to the site administrators.

The second method utilized in this study is Contingent Valuation Method (CVM) which aims to estimate tourists' willingness to pay to Mangrove forest area in Kadilangu, Kulon Progo. This study is expected to offer empirical, methodological, and policy contributions. By estimating the potential consumer surplus available for tourists from ecotourism in Kulon Progo Yogyakarta, it is expected to be also conducted in other tourism sites in Indonesia.

METHODOLOGY USAGE

The Area Surveyed

This study is located in Mangrove Forest Pasir Kadilangu Kulon Progo Regency of Special Region of Yogyakarta. Mangrove forest tourism Kulon Progo is one of the new tourism in Kulon Progo Regency today. The mangrove forest which is the end of this become very popular through social media. Usually the tourists are served with the natural beauty of sand beach slopes or with typical coral, but this mangrove forest is presented with a new atmosphere of mangrove forests into conservation in order to avoid abrasion of sea water. This mangrove forest is located in Pasir Mendit, Jangkaran Village, Temon Sub-district, Kulon Progo Regency.

Sampling Technique and Sample Size

Purposive random sampling technique was used to select the tourists to the mangrove forest. The sample size was 120 visitors.

Data Sources and Collection

Primary and secondary sources provided the data for the study. The primary data emanated from the well-structured questionnaire that was administered to the respondents during the field work. The secondary data were from books, journals, research reports and other relevant materials.

Analytical Techniques

Travel Cost Method (TCM)

Since Hotelling first suggested the approach almost 50 years ago, a wide variety of empirical models have been formulated to estimate willingness to pay based on travel cost models (Smith and Kaoru 1990). These models have ranged from simple gravity models (Freund and Wilson 1974) to complex multinominal logit, random utility models (Kaoru, Smith and Lieu 1994). Recently, modelling the role that site quality and characteristics play in determining demand for specific sites has received much attention. Kling (1986) reviews the various theoretical and empirical models for incorporating site characteristics in multiple-site, travel cost models.

Furthermore, Smith and Desvousges (1986) describe methods for including site characteristics and the impacts of substitution in travel cost analysis. Two techniques for estimating typical trip models differ in the definition of the dependent variable. The dependent variable is defined as either the sum of all visits to the site or the number of trips to the "typical" site. We use the first approach, specifying the total number of visits to the site by each individual as a function of the average travel cost and quality characteristics of the site visited and socio-economic variables such as income, education,

etc. Thus, a demand function of the following general form was estimated:

$$trip_i = \alpha_0 + \alpha_1 TC_i + \alpha_2 distance_i + \alpha_3 facility_i + \alpha_4 sosec_i + e_i \quad (1)$$

$trip_i$ is the number of trips individual *i* takes to the mangrove forest destination in last one year; TC_i is travel cost for trips to the mangrove forest destination visited by *i*; $distance_i$ is distance from i's home to the mangrove forest; $facility_i$ is subjective perception of individual i on quality of facilities in the mangrove forest destination in general (binary variable where 1 if good; 0 if bad). $sosec_i$ is vector of i's socio-economic characteristics; A survey was conducted for collecting the data. Respondents were asked to provide information about their trip such as "How many times have you visited this site in the last one year?"

Contingent Valuation Method (CVM)

The empirical CVM model is based on Hanemann's (1984) approach to estimate the mean willingness to pay from answers to the referendum style of contingent valuation questions used in the present survey. Mitchell and Carson (1989) describe the pros and cons of the referendum and alternative CVM question formats. Referendum CVM questions divide the sample into a discrete number of sub-samples.

Tourists were approached by a surveyor who introduced him/her-self and the study first and then asked them if they were willing to participate in the survey, then propose their willingness to participate in the survey. If a visitor was not willing to participate, then the surveyor approached the next available visitor. There was approximately 18% of visitor rejecting to join the survey. If a visitor was willing to participate in the survey, the questionnaire on a clip board was given to him or her to fill out. The questionnaire was collected by the surveyor once it was done on site. Similar on site survey method has been used by recent contingent valuation studies (Lee and Han 2002; Togridou *et al.*, 2006). In this study, respondents were first asked whether they were willing to pay for their experiences to mangrove forest site. Respondents were asked the maximum amount money they were willing to pay as a fee per trip if they had to pay for enjoying the mangrove forest site.

One simple approach towards econometric analysis of payment card data is to use the interval midpoints as the true unobserved WTP values and to use these values as the dependent variable in an ordinary least squares (OLS) regression model (Cameron and Huppert 1989). The WTP function for the *ith* respondent can be written as

$$(WTP_i) = Y_i'\beta + Z_i + \varepsilon_i \qquad (2)$$

Yi is a vector of social demography characteristics; Z is perception of sites quality in general; and $\varepsilon \sim N(0,\sigma^2)$. *WTPi*, is maximum willingness to pay of respondents for visiting the mangrove forest. The respondents were asked the maximum willingness to pay by bidding game technique. They were offered the initial bid and then raised until they no longer pay.

ESTIMATION USING THREE FUNCTIONAL FORMS

The basic assumptions necessary to statistically estimate demand include sufficient variation in prices or travel costs to identify the demand function, inclusion of relevant variables, such as income and other demographic variables, and substitute prices, then, there is no shortage of the site in question or that congestion is not limiting use (Rosenthal *et al.*, 1984). Most of the data used in our analysis are derived from a survey of tourists in the mangrove forest of Kadilangu, Kulon Progo during August of 2016. For this study, we use 120 observations in the mangrove forest Kadilangu Kulon Progo.

Three functional forms were used to estimate the econometric model of the mangrove forest visitor demand. The empirical importance of functional form has been noted by many authors (for example, Bockstael and McConnell (1980); Ziemer *et al.* (1980); Sutherland (1982). Ziemer *et al.* (1980) noted that different functional forms can generate very different magnitudes of benefits. The estimated models were then used to derive welfare measures for the annual average visitor.

The three functional forms estimated are: (1) linear; (2) semi-log where the dependent variable is transformed by taking the natural logarithm; and, (3) a log-log model where both the dependent and continuous independent variables are transformed by taking the natural logarithms. They compare and estimate from linear, semilog, and log-log models. The econometric models of this study are defined as follows:

Linear Model:

$$trip_i = \beta_0 + \beta_1 TC_i + \beta_2 distance + \beta_3 facility + \beta_4 income_i + \beta_5 age_i + \beta_6 educ_i + \varepsilon_i$$

Semi – Log Model:

$$lntrip_i = \beta_0 + \beta_1 TC_i + \beta_2 distance + \beta_3 facility + \beta_4 income_i + \beta_5 age_i + \beta_6 educ_i + \varepsilon_i$$

Log – Log Model:

$$lntrip_i = \beta_0 + \beta_1 lnTC_i + \beta_2 lndistance + \beta_3 facility + \beta_4 lnincome_i + \beta_5 lnage_i + \beta_6 lneduc_i + \varepsilon_i$$

$trip_i$ equals the number of visits of individual *i*; TC is the travel cost; distance is distance from home to the mangrove forest; facility is the subjective perception on site's quality of facility in the mangrove forest; income is income earned per month; age is age of individual; educ is years of schooling; ε_i is the normally distributed, random-error component with a mean of zero and a variance of Φ^2. The parameters to be estimated are: β_0, β_1, β_2, β_3, β_4, β_5, and β_6. Table 1 provides the summary statistics for the variables included in the econometric models.

Consistent with demand theory, we expected travels costs to be inversely related to the number of visits. Our expectations regarding the demographic variables were less definitive, given the uniqueness of the study site. However, typically we expect a positive relationship between the number of visits and income for mangrove forest site as indicated by numerous ecotourism studies in Europe (Ready and Navrud 2002).

We used a Box-Cox test (Ziemer *et al.*, 1980) to test the hypothesis of linear versus semi-log functional forms. The test statistic LAMBDA was equal to 0.00, indicating that the semi-log functional form (using the natural logarithm of the dependent variable) was a better fit for our data than the linear form. As we will show, the Box-Cox test result is consistent with the econometric estimation results presented in Table 2. The semi-log functional form consistent with the Box-Cox test, has been used with other TCM studies (Willis and Garrod 1991; Hanley 1989).

The notable advantages of using the semi-log functional form include minimizing the problem of heteroscedasticity, as well as eliminating the potential problem of negative trip prediction, which can occur using a linear functional form (Loomis and Cooper 1990). This is also true with the third model or the log-log functional form estimated for this site. Using a Breusch-Pagan test for heteroscedasticity, we found that by using either the semi-log or log-log functional forms, we failed to reject the null hypothesis of homoscedasticity at a significance level of 1%.

In this study, willingness to pay (WTP) for urban forests was modeled as a function of demographic characteristic, perceptions of tourism attribute importance and performance, and destination loyalty of the respondents. The following functional relationship was estimated using OLS technique.

$$(WTP_i) = f\,(Income_i, Age_i, Education_i, facility_i)$$

where income, age, and education of tourists were included in the model to control for demographic variables that may influence WTP.

Estimation Results and Welfare Estimates

The data used in our analysis are derived from a survey of tourists in mangrove forest Kadilangu Kulon Progo. The on-site survey questionnaire included a series of question on: the costs of the trip; willingness to pay for visiting the mangrove forest, respectively; and socio-demographic background. Summary statistics from the collected data are presented in Table 1.

Table 1. Variable Summary Statistics

Variable	Mean	Maximum	Minimum	Standard Deviation
Trip	2.07	6.00	1.00	1.19
WTP	11850	1000	50000	13086.64
TC	53.48	20.00	130.00	30.64
Income	1865.83	600.00	3600.00	836.96
Age	25.43	16.00	45.00	7.25
Educ	12.78	9.00	16.00	2.28
Facility	0.69	0.00	1.00	0.46

Table 1 shows that the average number of visits to mangrove forest Kadilangu Kulon Progo is about two times. The average willingness to pay (WTP) for visiting there is about IDR 11,850. The WTP values are obtained by interviewing the respondent by bidding game methods. After we give the hypothetical situation of the mangrove forest, the respondents were asked to provide information about their WTP such as "How much money would you spend for visiting the mangrove forest in Kadilangu Kulon Progo?". They are given an initial bid, then raised until they no longer pay. For visiting the mangrove forest of Kadilangu, Kulon Progo need travel cost about IDR 55,000 in average.

Travel Cost Method (TCM)

This method using Ordinary Least Squares (OLS) for estimating the regression model. This study did not use the maximum likelihood estimation because by testing Kolmogorov-Smirnov, the results show that Ho was rejected meant that the data was not Poisson-distributed. The maximum likelihood estimation was used for estimating the data which has Poisson distributed, and assumed that mean and variance were equal.

The notion of a linear regression model is not a linear model in parameters and variables, but the regression is linear in the parameters (or intrinsically linear through the transformation of the variable), whereas the variables may be linear or not. Therefore, this study using OLS estimation for three functional forms of linear, semi-log, and log-log model. The OLS estimation results for each of the functional forms presented in three equations above were included in Table 2. Consistent with the previously noted Box-Cox test, the log-log equation provided a better fit for the data than the linear and semi-log specification.

Table 2. Regression Result for Alternative Functional Forms[a]

Variable	Model		
	Linear	Semi-Log	Log-Log
Constant	4.459	1.412	3.526
TC	-0.009**	--0.003**	-0.055**
Distance	-0.073***	-0.037***	-0.917***
Facility	-0.055	-0.056***	-0.028
Income	0.0004*	0.0001	0.356***
age	0.027	0.010	0.567**
educ	0.047	0.009	0.299
Adj.R^2	0.5862	0.6004	0.6445
F-stat	26.68***	28.29***	34.15***

[a]Dependent variable, the number of visits, is the natural logarithm of for the semi-log and log-log models.
***, **,* indicate coefficients are significantly different from zero at 1%,5%, and 10% levels, respectively.

In addition, a joint *F*-test of the explanatory variables indicated that the semi-log and log-log and the linear models were significant overall at the 1% level. As expected with the linear model, we rejected the null hypothesis of homoscedasticity using the Breusch–Pagan test. As such, White's consistent standard errors are reported

for the linear model in Table 3, and used to test the null hypotheses that the coefficient estimates are equal to zero.

With respect to the coefficient estimates of the mangrove forest travel cost model, the travel cost coefficient estimate for each of the three model specifications was consistent with demand theory which was inversely related to price or travel cost. The coefficient estimate associated with the travel cost variable was significantly different from zero at a 5% level for the linear, semi-log and log-log model. The coefficient of income variable was also significantly different from zero at the 10% level for linear model specifications, at the 1% level for log-log model. This result is in line with the previously referenced ecotourism site valuation studies.

One possible explanation may be the creation of nature reserves in mangrove forests was thought to attract the higher income individuals. The age coefficient estimates were positive for log-log models significantly different from zero at the 5% level, indicating a positive relationship between age and the visits, but was not significantly different from zero for the linear and semi-log model. The years of schooling was not significantly different from zero for three models and the subjective quality of facility perception was significantly different from zero at 5% level for semi-log model, and were not significantly different from zero for the linear and log-log model.

The regression result of the mangrove forest travel cost model shows that the coefficient estimate associated with the travel cost variable was significantly different from zero at 5% level for the linear, semi-log and log-log model. When the travel cost model is applied to recreation demand it is assumed that there will be a negative relationship between the costs of trips and the number of trips taken, and consequently it is assumed that the demand curve will have a negative slope. The estimates of the demand equation for the forest recreation TCM for all visitors are presented in Table 3 below. The travel cost variable, mode of transport variable and both dummies are significant at the 1 % level. The TC variable is of the expected negative sign – as the costs of trips increase the lower number of trips is likely to be taken. The coefficient of income variable was significantly different from zero for the three model specifications.

Elasticity coefficient estimates provide information with regard to the visitor responsiveness to small changes in prices (both, entrance fees or travel cost components) or income, and can be useful to site administrators. Price and income elasticity coefficients for each of the models are presented in Table 3.[16]

Table 3. Price and Income Elasticity Coefficient Estimates

Functional form	Elasticity	
	TC price Elasticity	Income Elasticity
Linear	-0.232	0.360
Semi-Log	-0.006	0.186
Log-Log	-0.055	0.356

For the linear and semi-log of regression models, the elasticity coefficients are evaluated at the variable means. The price elasticity coefficients of the mangrove forest regression model for the linear, semi-log, and log-log models are −0.232, −0.006, and -0.055 respectively, indicating an inelastic demand such that a one percent increase in travel costs results in a corresponding less than one percent decline in the number of visits to mangrove forest for all three model specifications. The income elasticity coefficients for mangrove forest regression model specification are slightly less inelastic i.e. 0.360 for linear model; 0.186 for semi log model and 0.356 for log-log model (see Table 3).

[16]For the linear functional form the elasticity coefficients are estimated as βi (X/Y), and thus vary depending on the values of X and Y. Typically the elasticity coefficients are evaluated at the mean values of X and Y. Given the semi-log functional form, elasticity coefficients are estimated as the product βi X, where X is a vector of explanatory variables which are again typically evaluated at the variable mean values. Thus, for the semi-log model the price and income elasticity coefficients are calculated as β1TC, and β4 INCOME, where 'TC' and 'INCOME' are mean data values (Gujarati, 1995, p. 178). For the log-log model the coefficient estimates themselves are equivalent to the elasticity measures.

As such, administrators at the mangrove forest should recognize that the price elasticity of demand for the site may be slightly inelastic, in that the number of visits is somewhat not responsive to a change in price. For each of the models the income elasticity was positive, which would categorize the site in economic terminology as a normal good, in that as visitor incomes increase, visitors are more likely to prefer spending money on the mangrove forest sites.

The welfare measures for each model are summarized in Table 4. Ward and Beal (2000. 91–92) provide a summary of the formula used to estimate welfare measures for various visitor demand model functional forms using travel cost models.[17] The individual consumer surplus estimates measure the value that the average visits to the mangrove forest was willing to pay, but do not have to pay to visit the site, given an average access cost of IDR2.630 million, IDR5.700 million and IDR5.015 million, respectively.

Table 4. Consumer Surplus Estimates for the Mangrove Forest (IDR)

Functional Form		
Linear	**Semi-Log**	**Log-Log**
2,630,000	5,700,000	5,015,000

It is important to remember that TCM estimate the non-market benefits to individual users of the site, and that stated preference non-market valuation methods must be employed to estimate the non-use external benefits associated with ecotourism sites (Ready and Navrud 2002).

[17]The consumer surplus (CS) formulate for the linear, semi-log and log-log functional forms for a scenario of either adding or removing the site in question are as follows: Linear Model CS =(V1− V0)2/(−2βTC); Semi-Log Model CS =(V1− V0)2/(−βTC); Log-Log Model CS =(P1V1− P0V0)/(−βTC−1) where βTC is the coefficient estimates for the travel cost variable, V1 is the predicted number of visits evaluated at the average travel cost of IDR53480 (P1) for mangrove forestand V0 is set to equal zero visits in the linear model, and in the case of the semi-log and log-log models, V0 is set at a number near zero and P0, is the corresponding choke price. We set V0 equal to 1.0 * 10−8, for the semi-log and log-log models.

Contingent Valuation Method (CVM)

In the CVM section of the tourist survey, visitors were provided with background information about the mangrove forest such as the biodiversity, ecosystem, purpose of the sites, educational facilities, etc. They were then asked if they would have been willing to pay more for their current trip to the mangrove forest site to include a visit to their itinerary. The linear specification which provided the best fit with the data, is presented in Table 5.

Table 5. Regression Result for Alternative Functional Forms[a]

Variable	Model		
	Linear	Semi-Log	Log-Log
constant	20437.75	9.911	8.043
income	6.628**	0.0005**	0.932**
age	-694.63**	-0.058**	-1.482**
educ	44.948	-0.024	-0.432
facility	-5585.61**	-0.320	-0.304
Adj.R^2	0.0825	0.0872	0.0883
F-stat	2.586**	2.748**	2.784**

[a]Dependent variable, willingness to pay for mangrove forest site are linear, semi-log and log-log models.***, **,* indicate coefficients are significantly different from zero at 1%,5%, and 10% levels, respectively.

Willingness to pay of visitors in the mangrove forest was approximately IDR11850 in average (see Table 1 above). WTP estimation results for three model specifications of the mangrove forest was given in Table 5.

Coefficients of years of schooling were positive but not significant (see Table 5). Coefficient of age were significant with negative sign for three models. These indicates that the older visitors, the less visit to mangrove forest site will be. Income of visitor had a small but positive and significant influence on WTP. The subjective perception of facilities' quality was significant at level 5% for linear model, but were not significant for semi log and log-log model.

CONCLUSION

Ecotourism such as the mangrove forest site typically possess public goods characteristics, and thus non-market valuation methods must be employed to measure the benefits that they provide to visitors. The main purpose of this paper was to apply a revealed preference travel cost model to estimate visitor benefits associated with a ecotourism site, namely the mangrove forest. Our results show that consumer surplus welfare estimates can vary significantly depending on the functional form used to estimate visitor demand. Our results show that the consumer surplus estimates for individual visitors of the mangrove forest site are IDR 2,630,000; IDR 5,700,000; and IDR 5,015,000, for the linear, semi-log and log-log models, respectively. The estimated price and income elasticity coefficients for the mangrove forest can provide important information to the site administrators.

The result shows that price elasticity of demand estimates and visitors of mangrove forest were slightly not responsive to price changes and thus, the site's administrator should use alternative way to attract their visitors. There is positive income elasticity which suggests marketing efforts toward potential higher income visitors. They were recommended to visit the mangrove forest. Although estimates of visitor benefits are informative, recall one major concern with TCM is the estimation of visitor-use benefits only, and in the case of ecotourism site, non-use benefits may be substantial (Ready and Navrud 2002).

For investigating the non-use value of benefits associated with the ecotourism site, this study uses contingent valuation method to estimate the willingness to pay (WTP) of visitors of the mangrove forest Kadilangu Kulon Progo. The function of visitors' demographic characteristics, and perceptions of the facilities' quality were examined. Willingness to pay of visitors in the mangrove forest is about IDR11,850 on average. The result indicates that the higher the visitor's income, the higher their WTP. It might be because the creation of nature reserves in mangrove forests attractive for higher income visitors.

The difference in results between the CVM and TCM methods suggests that one or both are inadequate for these types of estimation. The TCM is based on real expenses and actual figures, but the CVM based on hypothetical situation which may not have yielded reliable results in this analysis because of a large variability in responses. It is about 30% of responses are zero bids. This may be due to the fact that the respondents did not throughly answer the question. Even the results of the travel cost method are also based on a number of assumptions, it would be more reliable when using the TCM method.

REFERENCES

Bockstael, N. E., and K. E. McConnell. 1980. 'Calculating Equivalent and Compensating Variation for Natural Resource Environments'. *Land Economics* 56:56- 63.

Cameron, T.A., Huppert, D.D. 1989. 'OLS versus ML Estimation of Non-Market Resource Values with Payment Card Interval Data'. *Journal of Environmental Economics and Management* 17 (3): 230–246.

Forrest, David, Grime, Keith, and Woods, Robert. 2000. 'Is It Worth Subsidizing Repertory Theatre?' *Oxford Economic Papers* 52: 381–397.

Freund, R. J. and Wilson, R. R., 1974. 'An Example of a Gravity Model to Estimate Recreation Travel'. *Journal of Leisure Research* 6: 241-256.

Hanemann, M. W. 1984. 'Welfare Evaluations in Contingent Valuation Experiments with Discrete Responses'. *American Journal of Agricultural Economics* 66: 332–341.

Hanley, N.D. 1989.'Valuing Rural Recreation Benefits: An Empirical Comparison of Two Approaches.' *Journal of Agricultural Economics* 40(3): 361–374.

Huszar, Paul C. and Seckler, David W. 1974. 'Effects of Pricing a "Free" Good: A Study of the Use of Admission Fees at the California Academy of Sciences'. *Land Economics* 69(1): 1–26.

Kaoru, Y., Smith, V. K. and Lieu, J. L., 1994. 'Using Random Utility Models to Estimate the Recreational Value of Estuarine Resources: Resources for the Future'. Discussion Paper No. 94–04. Washington, DC.

Kling, C. L., 1986. 'Measuring the Recreational Benefits of Environmental Amenities Using Multiple Site Models: An Evaluation of Techniques'. University of Maryland, College Park, MD., PhD N. Dissertation.

Kramer, R., Healy, R. and Mendelsohn, R., 1992. Forest Valuation. In *Managing the World's Forests*, edited by N. Sharma, 237–268. World Bank Natural Resources Development Series, Arlington, VA.: Kendall Hunt.

Loomis, John and Cooper, Joseph .1990. 'Comparison of Environmental Quality-Induced Demand Shifts Using Time-Series and Cross-Section Data'. *Western Journal of Agricultural Economics* 15(1): 83–90.

Maille, P. and Mendelsohn, R., 1993. 'Valuing Ecotourism in Madagascar'. *Journal of Environmental Management*, 38: 213-218.

Martin, F. 1994. 'Determining the Size of Museum Subsidies'. *Journal of Cultural Economics* 18: 225–270.

Mitchell, R. C. and Carson, R. T. 1989. *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, D.C.: Resources for the Future.

Ready, Richard C. and Navrud, St˙ale. 2002. Methods for Valuing Cultural Heritage. In *Valuing Cultural Heritage: Applying Environmental Valuation Techniques to Historic Buildings, Monuments and Artefacts*, edited by St˙ale Navrud and Richard C. Ready. Cheltenham: Edward Elgar.

Smith, V. Kerry. 1993. 'Nonmarket Valuation of Environmental Resources: An Interpretive Appraisal'. *Land Economics* 69(1): 1–26.

Smith, V. K. and Desvousges, W. H. 1986. *Measuring Water Quality Benefits*. Boston: Kluwer-Nyhoff.

Smith, V. K. and Kaoru, Y., 1990. 'What Have We Learned since Hotelling's Letter? A Meta Analysis'. *Economics Letters*, 32: 267-272.

Statistik Daerah Istimewa Yogyakarta. 2014. http://yogyakarta.bps.go.id/website/pdf_publikasi/. Statistik-Daerah-Istimewa-Yogyakarta-2014.pdf

Sutherland, R. J. 1982. 'The Sensitivity of Travel Cost Estimates of Recreation Demand to the Functional Form and Definition of Origin Zones'. *West Japan Agriculture Economics* 7:87-98.

Throsby, David. 2001. *Economics and Culture*. Cambridge University Press, U.K.

Ward, Frank A., Beal, D. 2000. *Valuing Nature with Travel Cost Models: A Manual*. Northampton, MA: Edward Elgar.

Willis, K.G. and Garrod, G.D. 1991. 'An Individual Travel-Cost Method of Evaluating Forest Recreation'. *Journal of Agricultural Economics* 42(1): 33–42.

Zen, L.W., Ulfah, F. 2015. 'Valuasi Ekonomi Hutan Mangrove di Pulau Dompak Kota Tanjungpinang Propinsi Kepulauan Riau'. *Dinamika Maritim* IV(1): 45-52.

Ziemer, Rod F., Musser, Wesley N., and Hill, R. Carter. 1980. 'Recreation Demand Equations: Functional Form and Consumer Surplus'. *American Journal of Agricultural Economics* 62: 136–141.

Estimating The Wconomic Value of Mangove Forest in Kulonprogo Yogyakarta Indonesia

ORIGINALITY REPORT

5%	%	5%	%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Suman Majumdar, Jinyang Deng, Yaoqi Zhang, Chad Pierskalla. "Using contingent valuation to estimate the willingness of tourists to pay for urban forests: A study in Savannah, Georgia", Urban Forestry & Urban Greening, 2011 Publication	2%
2	Michael Lockwood, Kathy Tracy. "Nonmarket Economic Valuation of an Urban Recreation Park", Journal of Leisure Research, 2017 Publication	1%
3	"A Primer on Nonmarket Valuation", Springer Science and Business Media LLC, 2017 Publication	1%

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	Off		