Consumer surplus analysis using the Travel Cost Method (TCM) at the Petrus Kafiar Beach tourist attraction, Manokwari Regency, West Papua

Yuyun Puji Rahayu, Ismi Haryati

Program Studi Ekonomi Pembangunan, Fakultas Ekonomi dan Bisnis, Universitas Papua, Manokwari, 98314, Indonesia
[+62 81287914155]

Abstract. *This study aims to determine the economic value of tourism objects and whether there is a consumer surplus at the Petrus Kafiar beach based on the Travel Cost Method (TCM). The consumer surplus value is obtained by using the Individual Travel Cost Method (ITCM) approach and willingness to pay to calculate the willingness to pay of tourists visiting Petrus Kafiar Beach. The value of WTP obtained is Rp 23.358,21 per person per visit. Meanwhile, the average WTP (willingness to pay) per year for one visit is only Rp 5.491,23. The results of the integral calculation to find the consumer surplus of visitors to the Petrus beach tourism object, the consumer surplus is ranged from Rp 5.201,5 to Rp 10.403,91 per individual/visit. As for the factors that influence the number of visits to Petrus Kafiar beach, two significant variables were found, namely the level of income and distance at the 95% confidence level.*

INTRODUCTION

Environment plays an important role in tourism. In this case, Indonesia is one of the countries with the largest island, which is 17.508 islands, and has various types of tourist objects scattered in the regions. With the diversity and richness of abundant natural resources such as natural beauty, stretches of valleys, rivers, various historical and cultural heritages, flora and fauna, and many more natural potentials that can provide benefits to serve as a tourist attraction so that it becomes an attraction for domestic and foreign tourists. Foreign countries to visit tourist attractions in Indonesia. Manokwari is one of the areas in West Papua Province and is the capital of West Papua Province. It also has several conservation areas. The conservation area in Manokwari Regency consists of the Arfak Mountains and Wondiwoy Mountains Nature Reserve and the Mount Table Nature Park. In addition, Manokwari Regency also has tourism potential, such as the beauty of the sea, coast, and lakes. Several tourist objects are now well managed or developed by the Manokwari Regency government, thus triggering many tourists who visit these objects.

Some of these attractions have just been managed and developed to become tourist attractions, one of which is the Petrus Kafiar beach. Petrus Kafiar beach is one of the tourist areas located in the North Manokwari District, Petrus Kafiar Village. Based on initial observations, the Petrus Kafiar beach area is managed by the local community and student groups who carry out fieldwork (KKN). However, at this time, the Petrus Kafiar

beach has been managed and developed by the Culture and Tourism Office (Disbudpar) of West Papua Province and was inaugurated on 25 October 2018, managed and maintained by the community and the Oridek tourism awareness group. Based on data from the Manokwari Regency Youth and Sports Tourism Office, Petrus Kafiar beach is a new tourist attraction, so there is no annual number of tourist visits to Petrus Kafiar beach tourism object. So to estimate or find out the number of tourist visits to Petrus Kafiar beach, it is calculated from the average number of visits to tourist objects and divided by the total number of existing tourist objects (10), assuming that the number of visits to all these tourist objects is the same as the number of tourists visiting Petrus Kafiar beach, it is estimated that the number of domestic and foreign tourist arrivals visiting Petrus Kafiar beach is 224 in 2016, and the number of domestic and foreign tourist visits in 2017 is 204.

Petrus Kafiar beach has the potential for natural resources and high environmental services, namely spiritual tourism, beach sports tourism, relaxing or just enjoying the scenery and for the local community, it is used as a fishing spot and many more potentials owned by this beach which can be used as the basic capital for the implementation of development and a source of revenue for the local community but also the receipt of future local revenue (PAD). This place is a non-marketable tourist spot, has no market price or undisclosed market price, and is also a public good and non-excludable (no restrictions) (Fauzi 2010). Therefore, anyone can use the oceans and coasts or environmental services on Petrus Kafiar beach and not have to make payments (non-exclusion principle) and someone's use of the oceans and coasts does not reduce the volume available to others (non-rivalry in consumption) (Suparmoko and Ratnaningsih 2012). This can threaten the natural environment's condition because most people or visitors do not care about the environment in case of damage.

Given the huge potential of natural resources owned by Petrus Kafiar beach, it is necessary to calculate the economic value or assign environmental values (valuations) to environmental goods and services at these tourist objects so that they can be used as consideration in planning and management, and in order to maintain their existence and sustainability the economic value of the resources in the tourism object. Based on this background, the formulation of the problem that will be discussed in this study is: what is the economic value of a tourist attraction and what factors affect the number of visits to the Petrus Kafiar beach based on the Travel Cost Method (TCM). Therefore, the purpose of this study is to determine the economic value of tourism objects and the factors that influence the number of visits to the Petrus Kafiar beach based on the Travel Cost Method (TCM).

RESEARCH METHODS

Study Area

Field survey began in December 2019 in Petrus Kafiar Village, respectively, at coordinates -0,8175948385651035; 134,0844633311414 (Figure 1). The research location is about 7,6 km from the central city of Manokwari. The area is near from some local villages and therefore the access to the location is surrounded by some residential areas but not overpopulated.

Data Collection

Sources of data used in this study were obtained from secondary data and primary data. Secondary data is data obtained from the processing of a second party or data obtained from the results of publications from other parties (Silalahi 2018), such data from the Department of Tourism, Youth and Sports of Manokwari Regency, the Central Bureau of Statistics of Manokwari Regency as well as data from the publication of other related parties with this research. While the primary data is data collected by the author directly from the location of the object of research that distributes questionnaires. This study aims for a purposive sampling technique, the Slovin formula is used, and the number of respondents is 67.

Data Analysis

Willingness To Pay (WTP) Analysis

The value of willingness and ability to pay visitors for the environmental benefits they feel or willingness to pay for environmental quality improvements is obtained by calculating the estimated average of WTP. The formula for calculating the alleged WTP, namely the average value that will be issued by respondents who are willing to pay, is calculated using the formula below:

$$EWTP = \sum_{i=1}^{n} Wi$$

Where:
EWTP = Average WTP value of visitor
Wi = The amount of WTP that is willing to be paid
i = Respondents who are willing to pay
n = Number of respondents

Analysis of the Economic Value of Petrus Kafiar Beach

The next step is to calculate the consumer surplus which is a reflection of the economic value and a proxy of the Willingness to Pay value for tourism objects (Fauzi 2004). The area under the demand curve is limited by the number of visits (Qe) at the upper limit and the lowest travel cost (0) at the lower limit, the equation used to calculate the consumer surplus for tourist attraction visitors uses the following formulation:

$$CS = \int_{0}^{Qe} f(Q)dQ$$

Where:
CS = Consumer Surplus
Qe = Frequency of Visits
$f(Q)dQ$ = Demand Function

Regression Analysis of Visits Frequency at Petrus Kafiar Beach

The linear regression equation used in this research model consists of one dependent variable with four independent variables. The dependent variable is the number of visits, while the independent variable consists of travel costs, distance, income, and education. The assumption is that travel costs, distance, income and level of education affect the number of visits. The following equation shows the regression model in this research.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Dimana :
Y = Number of visits (frequency of visits/year)
X_1 = Travel costs (Rp/visit)
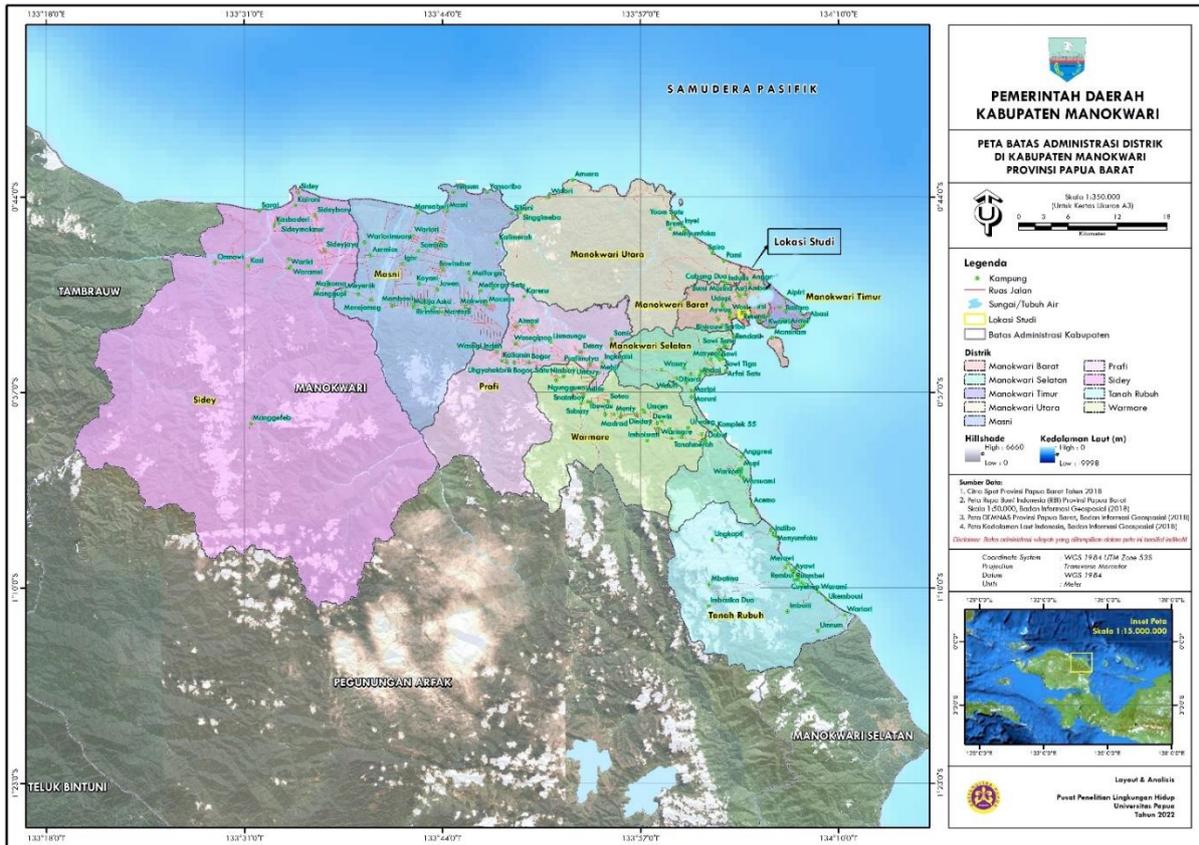X_2 = Distance (km)
X_3 = Income (Rp/month)
X_4 = Education (Score 1–4)
β_0 = constant
$\beta_1....\beta_4$ = Regression coefficient
ϵ = Standard Error

Source: PPLH University of Papua, 2022
Figure 1 The research location is located in the northern part of Manokwari

RESULTS AND DISCUSSIONS

Results

Willingness To Pay By Visitors of Petrus Kafiar Beach Attractions

To calculate the average cost incurred by respondents who are willing to pay, it is calculated based on questionnaire data and using the formula as described in the previous section. Then obtained WTP (willingness to pay) of: Rp 23.358,21 individual/visit. While WTP (willingness to pay) the average visit (Y) per year is Rp 5.491,23.

Analysis of the Economic Value of Petrus Kafiar Beach

The tourism demand model that has been obtained through regression analysis using the individual travel cost method approach is used to calculate consumer surplus. To produce a consumer surplus per individual, a certain integral is used with the upper limit being the number of visits of Rp 10,17 and the lower limit being the lowest travel cost of Rp 0 which was obtained based on the respondent's questionnaire. The following is an integral formula for calculating consumer surplus in this study:

$$
\begin{aligned}
\text{CS} &= \int_0^{10,17} (10,20 - 0,005Q)\, dQ \\
&= \int_0^{10,17} (2.040 - 200Q)\, dQ \\
&= [2.040Q - 100Q^2]_0^{10,17} \\
&= 20.746,80 - 10.342,89 \\
&= 10.403,91 \text{ per year/visitor}
\end{aligned}
$$

From the results of the integral calculation to find the consumer surplus of visitors to the Petrus beach tourism object, the consumer surplus per individual per year is Rp 10.403,91.
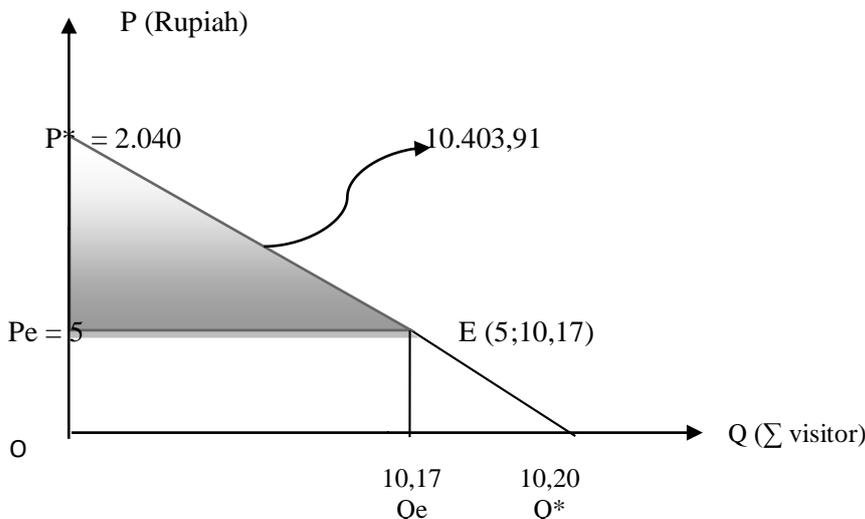

Figure 2 Consumer surplus

Based on Figure 2, the ability to pay Pe = IDR 5.000 per visit. However, each visitor has a different desire to pay; it can be higher or lower than the Pe value. Visitors who pay higher than the Pe value will receive a consumer surplus of IDR 10.403,91 per individual per year. The PeP*E triangle area is consumer surplus, the OP*EQe area is the willingness to pay (WTP), and the OPeEQe quadrilateral area is the ability to pay by visitors.

With a consumer surplus value of IDR 10.403,91 per individual per year or IDR 5.201,5 per individual per one visit, it shows that the benefits obtained by visitors to Petrus Kafiar beach are quite far above the ability to pay of IDR 5.000 so that it can be said that Petrus Kafiar beach provides significant benefits, which is greater than the costs incurred by visitors to enjoy the attractions of Petrus Kafiar beach.

Regression Analysis of Visits Frequency at Petrus Kafiar Beach

Based on the results of testing the variable X on the variable Y simultaneously and partially, it can be explained as shown in Table 1 and 2. Result in Table 1 showed that it simultaneously has a significant value of $0,000 < 0,05$. Thus, the hypothesis is proven, then H0 is rejected and H1 is accepted. It can be concluded that the variables travel costs (X1), distance (X2), income (X3), and education (X4) simultaneously have a significant effect on the number of visits (Y) to the Petrus Kafiar beach tourism object.

Table 1 Simultaneous Test (ANOVA[a])

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	191,11	4	47,78	7,804	0,000[b]
Residual	379,58	62	6,12		
Total	570,69	66			

The results of the t-test analysis showed that the travel cost variable has a probability/significant value of $0,904 > 0,05$ and has a negative effect. Which means that partially, the variable of travel costs has no effect on the number of visits (H0 is accepted and H1 is rejected). From the results of the analysis for the distance variable, it can be concluded that the variable X2 has a partial and negative effect on the number of visits (H0 is rejected, and H1 is accepted). While the results of income on the number of visits have shown the

probability/significant value of 0,011 < 0,05. Then it can be decided that income has a negative effect on the number of visits (H0 is rejected and H1 is accepted). The education variable, based on the results of the t test analysis is known that the probability/significant value is 0,249 > 0,05, so it can be concluded that the education variable (X4) is negative and partially has no effect on the number of visits (H0 is accepted and H1 is rejected).

Table 2 Partial test (t-Test)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	10,200	1,517		6,725	0,000
X1 Travel Cost (Rp)	-0,005	-0,038	-0,014	-0,121	0,904
X2 Distance (Km)	-0,465	-0,115	-0,422	-4,025	0,000
X3 Income (Rp/month)	-0,786	-0,302	-0,333	-2,607	0,011
X4 Education (Score 1-4)	-0,316	-0,363	-0,101	-0,870	0,387

Discussions

The different approach in this study compared to previous similar studies is in terms of showing the amount of value that can be paid by consumers (where the difference becomes consumer surplus) with the actual rupiah value spent by each visitor at the tourist site. According to Fauzi (2010), the use of natural resources for both economic and non-economic benefits can be assessed using direct or indirect valuation techniques. By knowing the value of WTP (Field 2001), the economic value of consuming goods and services based on the individual views of visitors at a tourist site can be determined. In other words, the added value that a visitor gets will be equal to the willingness to pay for it. Further explained in Fauzi (2010) that TCM is obtained from the equation of visitor demand which is influenced by costs such as travel costs and travel time costs which are calculated in one trip. So that the limitation of visitor characteristics in this study follows these conditions, namely visitors who, in a limited time, can visit one tourist spot and are able to pay fees during a visit to that tourist spot.

Related research has also been carried out recently in several different tourist attractions, and the results of the study show that the amount to be paid by tourist visitors is not too large (only tens of thousands of rupiah). Some tourist attractions that show these results are the results of research Khoirudin and Khasanah (2018) who conducted an economic assessment of tourism objects in Parangtritis Yogyakarta, Fikri and Rahmin (2020), who conducted the same research in Bukit Matang Pala and South Kalimantan, as well as research results Setyawan *et al.* (2020) who assessed fishing tourist attractions in the sea waters around Tanjung Kait Banten. It is further explained in Rosminiati *et al.* (2019), which assessed the WTP of tourist attractions in Aceh, that both domestic and foreign visitors are willing to pay more if they have more income. The distance between residence and tourist attractions also affects the willingness to pay, but not more than the total income (40%). But for visitors who are domiciled around tourist attractions, obviously, they do not need to spend such a large amount of travel costs. From the results also of this study, it can be concluded that for visitors who live close to the tourist attractions, the costs incurred do not reach 1% of the total visitor income.

Similar research is mostly done in other tourist places in Indonesia. The results of these researches show that the calculated WTP ranges from IDR 10.000.00 to IDR 100.000,00 per visitor (Dwijayanti *et al.* 2015; Dharmawan *et al.* 2016; Fikri and Rahmin 2020) even millions of rupiah (Rosminiati *et al.* 2019), but there are also several other tourist attractions which are only 1.000–10.000 rupiah (Khoirudin and Khasanah 2018; Terry *et al.* 2020; Litriani 2021). The magnitude of this value is on average influenced by age, education level and gender as shown in the results of research conducted by (Dharmawan *et al.* 2016; Hasbiah *et al.* 2018; Ikhwana and Khalik 2022). Even the same results about the factors that significantly affect the WTP of tourist

attractions in Thailand are shown by Panwanitdumrong and Chen (2022). Similar with the results of this study, it appears that Petrus Kafiar Beach is more attractive to teenagers or those who are students. The reason is that the place visited is a newish area of the tourist place and a bit close to their campus or school. Therefore, it becomes their consideration in addition to the consideration of travel costs which is not too expensive. According to Grilli *et al.* (2021), factors that affect the WTP of visitors depend on the preferences variability of previous and prospective visitors. Regarding this study, the prospective visitors are interested in the wider aspects of the tourism experience, which in turn require the careful management of social and environmental resources in the tourist place.

Therefore, it is expected that in the future, the government can cluster tourist attractions according to the type of visitors so that the strategy for developing tourist destinations in Manokwari district and in West Papua province becomes definitely more targeted. A study that supports this recommendation is done by Jeon and Yang (2021), which showed that during the Covid-19 Pandemic, the type of visitors affected tourist's WTP. From the results of the F test, a significant value of $0,000 < 0,05$ was obtained. Based on these results, it can be concluded that the variables travel costs (X1), distance (X2), income (X3), and education (X4) simultaneously have a significant effect on the number of visits to the object of Petrus Kafiar beach. The results of this study are similar to previous research by Rusmusi and Putra (2018), which concluded a significant effect on the number of visits to the Baturraden Botanical Gardens using similar dependent variables.

In the results of the t-test analysis, it can be seen that the travel cost variable has no partial and significant effect at 0,904, greater than 0,05, and has a negative sign on the number of visits. The results of this study are not the same as the results of previous studies by Nugroho (2010) and Abidin and Marlina (2019), which are significant and have a negative sign. This is in accordance with the economic theory that the consumption of an item or service is influenced by the price level, that is, by the law of demand, which states that the lower the price of an item or service, the higher the demand for the item, and conversely, the higher the price of an item or service, the lower the demand for the product. A similar result for education variable (X4), which partially has no significant effect and has a negative sign. Based on this value, it can be concluded that as the respondent's education level increases, the number of tourist visits decreases. This is because respondents with higher education have other choices besides recreation at Petrus Kafiar Beach. The results of this study are similar to previous research by Nugroho (2010), which is negatively and significantly related. This study also has a negative relationship but does not have a partial effect. This is because education does not affect a person to visit or not visit Petrus Kafiar beach attractions even though the respondents in this study were students, and their visits are not because of educational status but only for recreation or using spare time for a vacation.

Different results which are significant showed by income and distance variables. Based on the results of the t-test analysis of income, it has a partial and negative effect with a significant value of 0,011, which is smaller than 0,05. High income allows visitors to visit other exotic destinations at a higher cost. This shows that Petrus Kafiar beach is a destination with the category of lower-middle income visitors. If income increases, the demand for goods classified as inferior goods will decrease. Buyers/visitors who experience an increase in income will reduce their spending on inferior goods and replace them with better quality goods. The results of this study are similar to previous research by Faizal and Arianti (2015). In addition, it is also found that the distance variable has a partial and negative effect with a significant value of 0,000 (smaller than 0,05). The distance that is too far from home to a tourist attraction will have an impact on increasing travel costs so that someone will think again about doing tourism activities and choose tourist attractions that are closer at a lower cost. The results of this study are similar to previous studies by Nugroho (2010) and Rusmusi and Putra (2018). The longer the distance between the residence and the tourist attraction will have a negative effect on the number of visits, so the demand for tourism will decrease.

CONCLUSION

Based on the results of research conducted on the analysis of the economic value of the Petrus Kafiar beach tourism environment in Manokwari Regency with the travel cost method approach, it can be concluded that the consumer surplus for visitors to the Petrus beach tourism object is economically affordable. The consumer surplus is ranged from IDR 5.201,5 to IDR 10.403,91 per individual visit. Based on factors that influence the number of visits to Petrus Kafiar beach, there are two significant variables (income and distance) and two insignificant variables (educational level and travel cost) at the 95% level of confidence.

REFERENCES

[PPLH] Pusat Penelitian Lingkungan Hidup Universitas Papua. 2022. *Peta Batas Administrasi Distrik di Kabupaten Manokwari, Provinsi Papua Barat*. Manokwari: PPLH Universitas Papua.

Abidin Z, Marlina L. 2019. Valuasi ekonomi kawasan wisata pulau pisang Kabupaten Pesisir Barat. *Ilmu-Ilmu Agribisnis*. 7(4):564–547.

Dharmawan A, Subiyanto S, Nugraha A. 2016. Analisis Nilai Ekonomi Kawasan Cagar Budaya Keraton Di Kota Cirebon Berdasarkan WTP (Willingness To Pay) Dengan Pendekatan TCM (Travel Cost Method) Dan CVM (Contingent Valuation Method). J Geod Undip. 5(2):25–33.

Dwijayanti M, Sudarsono B, Suprayogi A. 2015. Analisis nilai wtp (willingness to pay) untuk menentukan nilai ekonomi kawasan wisata alam di Kabupaten Semarang berbasis Sistem Informasi Geografis (SIG) (studi kasus, Kecamatan Bandungan, Kecamatan Sumowono, Kecamatan Ungaran Barat). *J Geod Undip*. 4(1):213–222.

Faizal MA, Arianti F. 2015. Analisis faktor-faktor yang mempengaruhi kunjungan wisatawan ke Pantai Kartini, Jepara [undergraduate thesis]. Semarang: Universitas Diponegoro.

Fauzi A. 2010. *Ekonomi Sumber Daya Alam dan Lingkungan: Teori dan Aplikasi*. Jakarta: PT. Gramedia Pustaka Utama.

Field BC. 2001. *Environmental Economics: An Introduction*. 7th ed. New York (NY): McGraw Hill.

Fikri MR, Rahmin N. 2020. Willingness to pay bukit matang kaladan tiwingan Village Aranio District Banjar Kalimantan Selatan. *Jur Ilmu Ekon dan Stud Pembang*. 3(1):158–170.

Grilli G, Tyllianakis E, Luisetti T, Ferrini S, Turner RK. 2021. Prospective tourist preferences for sustainable tourism development in small island developing states. *Tour Manag*. 82 (104178):1–12. doi:10.1016/j.tourman.2020.104178.

Hasbiah AW, Rochaeni A, Sutopo AF. 2018. Analisis kesediaan membayar (willingness to pay) dan kesediaan untuk menerima kompensasi (willingness to accept) dari keberadaan tempat penampungan sementara ciwastra dengan Contingent Valuation Method. *Infomatek*. 20(2):107–116. doi:10.23969/infomatek.v20i2.1211.

Ikhwana H, Khalik W. 2022. Valuasi objek wisata kebun raya lemor menggunakan contingent valuation method (CVM). 1(1):47–55.

Jeon CY, Yang HW. 2021. The impact of the covid-19 pandemic on tourists' wtp: Using the contingent valuation method. *Int J Environ Res Public Health*. 18(16):1–14. doi:10.3390/ijerph18168605.

Khoirudin R, Khasanah U. 2018. Valuasi ekonomi objek wisata Pantai Parangtritis, Bantul Yogyakarta. *J Ekon dan Pembang Indones*. 18(2):152–166.

Litriani E. 2021. Estimasi nilai ekonomi kawasan wisata religius makam kawah tengkurep dengan pendekatan TCM dan CVM. *Jurnal Bina Bangsa Ekonomika*. 14(02):406–416.

Nugroho PS. 2010. Valuasi ekonomi wisata pantai glagah dengan pendekatan biaya perjalanan (travel cost) di Desa Glagah Kecamatan Temon Kabupaten Kulon Progo [undergraduate thesis]. Surakarta: Universitas Sebelas Maret.

Panwanitdumrong K, Chen C-L. 2022. "Are Tourists Willing to Pay for a Marine Litter-Free Coastal to Achieve Tourism Sustainability? Case Study of Libong Island, Thailand." *Sustainability* 14(8):4808–25.

Rosminiati R, Syahnur S, Hamzah A. 2019. Faktor-faktor permintaan dan kesediaan membayar wisatawan terhadap objek wisata berdasarkan travel cost method. *J Ekon dan Kebijak Publik Indones*. 6(1):50–67. doi:10.24815/ekapi.v6i1.14258.

Rusmusi IMP, Putra IA. 2018. Analisis valuasi ekonomi kawasan kebun raya Baturraden. *Riset Ekon Pembangunan*. 3(2):347–357.

Silalahi U. 2018. *Metodologi Analisis Data dan Interpretasi Hasil untuk Penelitian Sosial Kuantitatif*. 1st ed. Atif NF, editor. Bandung: PT. Refika Aditama.

Setyawan TB, Fahrudin A, Adi Susanto H. 2020. Valuasi ekonomi wisata memancing di perairan laut sekitar Tanjung Kait, Tangerang, Banten: pendekatan Contingent Valuation Method dan Travel Cost Method. *J Reg Rural Dev Plan*. 4(3):172–185. doi:10.29244/jp2wd.2020.4.3.172-185.

Suparmoko, Ratnaningsih M. 2012. *Ekonomika Lingkungan*. 2nd ed. Yogyakarta: BPFE Yogyakarta.

Terry J, Mukti A, Sunaryati R. 2020. Valuasi ekonomi objek wisata dermaga kereng bangkirai Sungai Sebangau Kota Palangka Raya. *J Environ Manag*. 1(2):83–90. doi:10.37304/jem.v1i2.1756.