



Economic Valuation of Payum Beach, Indonesia: A Travel Cost Method Approach

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ABSTRACT

Payum Beach is located in the southern part of Merauke Regency, South Papua Province, along the Arafura Sea, offering diverse biodiversity and providing vital environmental services, including tourism and protection from erosion and abrasion. Assessing the economic value of these environmental services is important for understanding their contribution to local welfare and supporting sustainable development policies. This study aims to assess the economic value of Payum Beach in Merauke, Indonesia, using the Travel Cost Method (TCM). The sample was taken by randomly selecting respondents at the beach location during tourism activities. Group visitors must be at least 17 years old (adult). The target respondents were around 31 people, including local tourists and tourists from outside Merauke, Indonesia. The economic value of the coast along Payum Beach, with an estimated 6448 local tourists visiting the natural panorama, accounted for about 6 per cent of the total tourist visits along the coast of the Arafura Sea in 2016, at a minimum cost of Rp. 79,522. According to the TCM analysis, despite having a low or no entrance fee, Payum Beach generates substantial economic benefits through its recreational and environmental services. The findings demonstrate that the beach possesses significant economic value for visitors and should be recognized as an important natural asset. These results provide evidence for the Merauke Regency and South Papua Provincial governments to consider Payum Beach as a long-term investment and prioritize its sustainable management and conservation.



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INTRODUCTION

Payum Beach is located in the southern part of Merauke Regency, South Papua Province, along the Arafura Sea, offering diverse biodiversity and providing vital environmental services, including tourism and protection from erosion and abrasion. The economic value of coastal areas in Merauke is recorded at Rp213 billion per year based on the estimated environmental services produced in 2016 (Mukhlis, Suradi, et al., 2023; Mukhlis, 2025b). The high estimated economic value of the Payum Beach coastal area remains threatened by sand excavation activities, which trigger abrasion and could reduce the beach's economic value. Despite this ecological and economic importance, empirical evidence on the recreational economic value of Payum Beach remains limited, particularly from the perspective of visitors' travel expenditures and demand for coastal tourism.

Economic value assessment to provide an assessment of the benefits of the existence of the area for the local community. The data and information provide an overview of sustainable development policies through environmental services that support tourism. Payum Beach is one of the coastal areas with potential for environmental service-based tourism in Merauke. However, information on the economic value of environmental services in Payum Beach is not yet fully available to support economic valuation as an important basis for conservation and planning for future tourism development. According to (Widiastuti et al., 2018) Economic valuation can motivate local governments to allocate funds and develop policies to protect beaches from environmental degradation by assigning value to these environmental services. This indicates a clear research gap: although Payum Beach has strategic

tourism and conservation potential, no specific study has quantified its recreational value using a visitor-based economic valuation approach.

An assessment of the economic value of the Payum Beach area is not yet available, despite the benefits the community receives from its presence. This valuation data on the economic value of the environment can inform policies that support the development of sustainable environmental services, such as tourism activities, and the livelihoods of local communities. One method for calculating economic value is TCM, which considers travel cost, distance, and visit duration to determine the economic value of tourism. Assessing the potential economic impact of tourism demonstrates the importance of environmental services to the local economy (Nurhasanah & Munawir, 2022). This study aims to assess the economic value of Payum Beach in Merauke, Indonesia, using the Travel Cost Method (TCM). The findings are expected to provide an empirical basis for coastal conservation, tourism planning, and local government policy in managing Payum Beach sustainably.

RESEARCH METHODS

The Research was carried out in the Payum Beach area at RT 23 / RW 27, Samkai Village, Merauke Regency, South Papua, along the southern coast of Merauke City, approximately 7 km from the centre of Merauke. Access to the area is available by land transportation. Although this beach area is open to the public, it is managed by the community and supervised by the local government. The unit of analysis in this study was individual visitors to Payum Beach. Respondents were selected using an accidental random sampling approach, in which visitors encountered at the beach during tourism activities were invited to participate if they met the inclusion criteria. The inclusion criteria were: visitors aged at least 17 years, visitors who had completed or were conducting tourism activities at Payum Beach, and visitors who were willing to provide information on their socioeconomic characteristics, visit frequency, and travel expenditure. The minimum age criterion was used to ensure that respondents were able to understand the questionnaire items and independently report their travel decisions and costs. The sample was taken by randomly selecting respondents at the beach location during tourism activities. Group visitors must be at least 17 years old (adult). The target audience is around 31 people, including local tourists and tourists from outside Merauke, Indonesia. This study used questionnaires and in-depth interviews with respondents and local communities. After that, the questionnaire results were processed using Excel/SPSS. Furthermore, the data were analysed descriptively, and a linear regression model was estimated using the Travel Cost Method (TCM). Furthermore, the data are calculated as consumer surplus relative to economic value. Socioeconomic characteristics of respondents (e.g., age, education, occupation, and income), visit patterns (origin, frequency, length of stay, and time of visit), and travel expenses incurred by visitors. Direct observation was conducted to assess the environmental conditions of Payum Beach, including cleanliness, public facilities, accessibility, tourist activities, and beach vegetation. Respondents are parties who understand the condition of the location, namely, Samkai Village officers, local communities, and regular visitors. Information from village officers and local communities was used to complement visitor survey data, particularly for describing site management, environmental conditions, and annual visitor trends.

1. TCM analysis requires several key variables obtained from the questionnaire results, including:
 - a. Dependent variable (Y): the number of respondents' visits to Payum Beach in the last 12 months (times/year).
 - b. Independent variable (X)
 - 1) X₁: total travel costs (Rp/person), consisting of transportation, consumption, and estimated time costs;
 - 2) X₂: respondent's monthly income (Rp);
 - 3) X₃: age (years);
 - 4) X₄: last level of education;
 - 5) X₅: length of on-site visit (hours);
 - 6) X₆: number of entourage (people);
 - 7) X₇: environmental condition variable

The basic model of analysis used in this study is formulated in the form of multiple linear regression equations as follows:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + e$$

where:

- a. Y = frequency of visits per year,
- b. a = constant,
- c. b_1 – b_7 = regression coefficient,
- d. e = error term.

The travel cost coefficient (b_1) is expected to be negative, so the results indicate that higher travel costs are associated with fewer frequent visits. (Ermayanti, 2012)

2. Valuation of Economic Value (Consumer Surplus)

The assessment of economic value based on consumer surplus using the individual approach (Individual Travel Cost Method) is systematically carried out as follows:

a. Establishment of the Visit Request Function

The first step is to form an individual demand function through multiple linear regression analysis, where this function relates the number of visits (Q_x) to travel costs (P) and other socioeconomic variables, which can be written as (Kusuma, 2015) :

$$D_x = Q_x = a - bP$$

Where

- 1) D_x or Q_x : The number of visit requests.
- 2) a: Constant.
- 3) b: Travel cost regression coefficient
- 4) Q: Travel Cost

The travel cost coefficient (b) is expected to be negative, indicating that an increase in travel costs will decrease the number of requests for visits

b. Valuation of Consumer Surplus

The value of consumer surplus per individual is calculated using a finite integral. after the request's function is known. The assessment was carried out by integrating the demand function from the lowest price limit (P_{min}) to the highest price upper limit (P_{max}) issued by respondents. The formula for calculating consumer surplus is as follows (Kusuma, 2015):

$$SK = \int_{min}^{maks} f(P_x) dP$$

Where:

- 1) SK: Consumer surplus per individual.
- 2) P_{max} : The highest (maximum) travel cost or choke price where visits become zero.
- 3) P_{min} : Lowest (minimum) travel cost or average actual cost.
- 4) $f(P_x)$: The function of a visit request against a fee.
- 5) This integral yield value represents the profit or more satisfaction that visitors feel over the costs they incur.

c. Estimated Total Economic Value

The total economic value of a tourist area is valued by multiplying the per-person consumer surplus by the total number of visitors over a given period (for example, one year).

$$\text{Total Economic Value} = \text{Consumer Surplus per Individual} \times \text{Total Visitors per Yea}$$

RESULTS AND DISCUSSION

A. DATA SECARA DESKRIPTIF

1. Deskripsi Pengunjung Kawasan Wisata Pantai Payum

This study involved 31 respondents who visited Payum Beach in Merauke Regency; the respondents' characteristics are presented in Table 1. To improve consistency, all monetary values are reported in Indonesian Rupiah (IDR), percentages are reported with one decimal place, and visit frequency is expressed as visits per year.

Tabel 1. General Description of Pantai Payum Visitors

No	Description				Remarks					
1	Number of respondents (total people):				31					
2	Gender (%):									
	Male:	58	Female:		42					
3	Average Age (Years):				33					
4	Distribution of jobs (%):									
	Not Working:	3,2	Home makers :	22,6	Self-employed:	19,4	Students:	22,6	PNS:	32,3
5	Education Level (%):									
	SD:	9,7	SMP:	6,5	SMA:	71,2	D3:	3,2	S1:	9,7
6	Average earnings:				Rp.3.335.483					
	Respondents are from (%):									
7	1. Inner-City:				90,3					
	2. Out of City (Village):				9,7					
8	Average Travel Cost				Rp.79.522					
9	Average Frequency of Visits in a Year:				12 Kali					
10	Average Mileage (Km):				4,5					

Keterangan: SD= Elementary School, SMP= Junior High School, SMA= Senior High School, D3= Diploma Three, S1= Bachelor of One Strata.

2. Total Expenditure Data

Total expenditure data is presented in Table 2.

Table 2. Total Cost of Travel Expenses

No	Nama	Jarak (km)	Biaya Transport (Rp)	Biaya Makan/Minum (Rp)	Lama Perjalanan (jam)	Nilai Waktu (Rp/jam)	Total Waktu Perjalanan (Rp)	Total Pengeluaran
1	Bernard	7	15000	30000	0,5	17000	23500	68500
2	Lahisa	3	26000	15000	0,75	17000	38750	79750
3	Arios	10	30000	50000	0,67	17000	41390	121390
4	Yesti	2	7500	10000	0,2	17000	10900	28400
5	Sutaman	3	15000	50000	0,33	17000	20610	85610
6	Eka	2	7500	30000	0,17	17000	10390	47890
7	Yohana	2	0	5000	0,75	17000	12750	17750
8	Juanda	5	20000	10000	0,33	17000	25610	55610
9	Akbar	1	0	5000	0,5	17000	8500	13500
10	Syarifuddin	1	7500	10000	0,17	17000	10390	27890

11 Ana	30	200000	50000	3	17000	251000	501000
12 Wemo	7	35000	20000	0,5	17000	43500	98500
13 Viviana	1	15000	15000	0,17	17000	17890	47890
14 Indah	1	20000	10000	0,75	17000	32750	62750
15 Maria	2	50000	10000	0,33	17000	55610	115610
16 Deni	5	30000	50000	1	17000	47000	127000
17 Yakobus	3	10000	10000	0,33	17000	15610	35610
18 Vince	0,5	0	20000	0,17	17000	2890	22890
19 Iwan	3	10000	10000	0,25	17000	14250	34250
20 Fahri	7	25000	15000	0,75	17000	37750	77750
21 Rani	6	20000	15000	0,75	17000	32750	67750
22 Yana	10	30000	30000	0,5	17000	38500	98500
23 Yani	2	13000	10000	0,5	17000	21500	44500
24 Putra	2	7500	30000	0,17	17000	10390	47890
25 Paul	3	15000	25000	0,25	17000	19250	59250
26 Hariyanti	4	50000	50000	0,5	17000	58500	158500
27 Clara	2	10000	30000	0,33	17000	15610	55610
28 Frans	2	15000	20000	0,5	17000	23500	58500
29 Anto	7	30000	10000	0,75	17000	42750	82750
30 Lukas	4	15000	25000	0,5	17000	23500	63500
31 Ahmad	2	7500	30000	0,17	17000	10390	47890

The average total cost of a trip is IDR 79,522, with an average of 12 visits per year and a distance of 4.5 km. This data shows that Payum Beach is a local tourist destination that is inexpensive, easy to reach, and often visited by people both in and around the city.

The economic value of the coast along Payum Beach, with an estimated 6448 local tourists visiting the natural panorama, accounted for about 6 per cent of the total tourist visits along the coast of the Arafura Sea in 2016, at a minimum cost of Rp. 79,522. According to TCM, Payum Beach offers a low or no entry fee, which is often mistaken for a sign of low regional economic value. These collectable environmental assets have significant value to every visitor each year due to their landscapes. Based on this data and information, it can change the perspective of the Merauke district government and South Papua Province on their natural assets as long-term investments.

3. Reasons to Choose Payum Beach as a Travel Destination

The factors that encourage tourists to visit Payum Beach are presented in Table 3, along with the main reasons selected by each respondent.

Table 3. Reasons for Choosing Payum Beach

Top Reasons to Choose Payum Beach	Number of Choices (2 choices/person)	Percentage (%)
Close range	18	29,0
Low cost	14	22,6
Scenery	23	37,1
Quiet/quiet	6	9,7
Hygiene	1	1,6
Total	62	100,0

In addition to asking for the main reasons for visiting, this study identifies the activities tourists engage in while on Payum Beach. This is important for understanding patterns of visitor activity and forms of use in tourist areas.

Based on Table 3, the beautiful natural scenery is the most dominant factor in the beach's main attraction, as it is still natural and visually appealing. This illustrates that the beauty of the coastal landscape and the natural atmosphere are the strongest values in shaping people's interest in visiting.

In addition, the beach's proximity to the residence and the low cost of visiting indicate that most visitors choose Payum Beach for its accessibility and affordability. Equipped with a quiet beach atmosphere and environmental cleanliness as additional considerations. Thus, the Payum Beach area is popular with tourists for its natural attractions and easy access, rather than for artificial facilities. This depicts the character of local tourists who are more interested in tranquility, simplicity, and natural beauty than in the comforts offered by modern environments such as cafes or amusement rides.

The researcher not only asked about the main reasons for visiting, but also identified the types of activities tourists engaged in at Payum Beach to determine patterns in visitor activity and the forms of use of the tourist area. Information about the types of respondents' activities in Payum Beach is presented in Table 4.

Table 4. Types of Respondent Activities at Payum Beach

Types of Activities on the Beach	Number (people)	Percentage (%)
Traveling/recreation/taking pictures	23	74,19
Fishing	3	9,68
Learn about vehicles	3	9,68
Organizational activities	2	6,45
Total	31	100,00

Based on Table 3, the most commonly carried out activities by visitors are traveling, recreation, and taking pictures. Tourists come to Payum Beach to enjoy the beach atmosphere, relax, and capture moments in the open, especially to take in the sunset in the afternoon. Only a small number of tourists take advantage of the beauty of Payum Beach to fish and learn to drive. Meanwhile, organizational activities, such as community events, campus activities, or social events, are attended by only a small number of visitors. Thus, the main function of Payum Beach for the people of Merauke, Indonesia, is as a public recreation space that is open and easy to reach for everyone/various circles, with no tickets/entrance tickets for Regional Original Revenue (PAD), limited only to levies by the local community as their income. This pattern shows that Payum Beach plays an important social role for the surrounding community, both as a place of recreation and as a space for community interaction and psychological recovery amid the city's busy/crowded life.

B. DATA PROCESSING RESULTS

1. Regression analysis using SPSS

Using regression analysis in the Statistical Package for the Social Sciences (SPSS) version 25, the results presented in Table 5 were obtained.

Table 5. Linear Regression Results

Y	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1. (Constant)	.849	19.215		.044	.965		
Total Production Revenue	-7.034E-5	.000	-.455	2.404	.026	.616	1.622
Age	1.068E-6	.000	.254	.881	.389	.265	3.768
	-.190	.324	-.150	-.585	.565	.337	2.968

Education	-2.339	2.896	-.168	-.808	.429	.510	1.960
Length of Stay	5.077	1.808	.511	2.809	.011	.668	1.497
Entourage	.066	.493	.022	.135	.894	.847	1.180
Hygiene	-2.502	3.816	-.142	-.656	.519	.473	2.116
Facilities	1.882	4.808	.072	.391	.700	.645	1.550
Satisfaction	1.702	2.340	.151	.727	.475	.510	1.961
Crowd Level	6.790	2.897	.395	2.344	.030	.778	1.285
2. Dependent Variable: Frequency of Visits (times/year)							

2. Test Collinearity

Based on the results of the multicollinearity test, all independent variables in the regression model have VIF values < 5 . These results show that there is no strong relationship among the independent variables (no multicollinearity). Thus, each variable is free to provide different information, and the regression model used is considered feasible and stable for further analysis. According to Daoud (2018), if the VIFs of more than 5 independent variables overlap in explaining the dependent variable, then the free variable no longer captures the pure influence of each variable on the dependent variable.

3. Results of Regression Analysis of Travel Cost Method (TCM)

Based on the results of linear regression analysis, the determination of the significance of each independent variable to the frequency of visits is carried out by looking at the significance value (Sig.), whose assessment criteria are as follows:

- Sig. A p-value < 0.05 indicates a significant Influence, meaning it has a real effect on the frequency of visits.
- Sig. between $0.05-0.10$ is a variable with marginal (weak) Influence, meaning it is not too strong but may still be relevant.
- Sig. > 0.10 is a non-significant variable, meaning that there is no significant effect on the frequency of visits.

Based on the linear regression results, not all independent variables have a significant effect on the frequency of tourist visits to Payum Beach. The variables that have a real effect are total expenses (travel costs), length of stay at tourist sites, and crowd level; all four variables have a significant effect. < 0.05 , so that statistically significant effects the number of tourist visits. From the results of the linear regression, it was found that the function of tourist visit requests (Y) is as follows:

$$Y = 0,849 - 7,034 \times 10^{-5}(X_1) + 1,068 \times 10^{-6}(X_2) - 0,190(X_3) - 2,339(X_4) + 5,077(X_5) + 0,066(X_6) - 2,502(X_7) + 1,882(X_8) + 1,702(X_9) + 6,790(X_{10})$$

Remarks:

- Y (Dependent): Frequency of Visits (times/year)
- Konstanta (a): 0,849
- X₁ (Total Expenses): Coefficient $7,034 \times 10^{-5}$ (or -0,00007034).
- X₂ (Revenue): Coefficient $1,068 \times 10^{-6}$ (or 0,000001068).
- X₃ (Age): -0,190
- X₄ (Education): -2,339
- X₅ (Length of Stay): 5,077
- X₆ (Entourage): 0,066
- X₇ (Hygiene): -2,502
- X₈ (Fasilitas): 1,882
- X₉ (Kepuasan): 1,702
- X₁₀ (Tingkat Keramaian): 6,790

3.1. Relationship of Total Expenses to Frequency of Visits

The factors tourists cite for choosing Payum Beach as a tourist attraction, as shown in Table 3, indicate that it is in demand due to its low cost and proximity. These results suggest that Payum Beach is an affordable destination. The results showed that the total expenditure (cost) variable had a significant negative effect, as shown in Figure 1.

Figure 1 shows the relationship between total travel costs (X) and the frequency of tourist visits (Y). As total travel costs increase, the frequency of tourist visits tends to decrease. This pattern is in accordance with the legal principle of demand in economics, where increasing costs will reduce the demand for an activity, in this case, recreational activities in Payum Beach.

These results indicate that visitors to Payum Beach are relatively sensitive to changes in travel costs, and that increases in transportation costs, consumption, and long travel times can reduce interest in visiting again. In other words, if the cost of spending increases, then the frequency of tourist visits will decrease, as seen in the demand curve above.

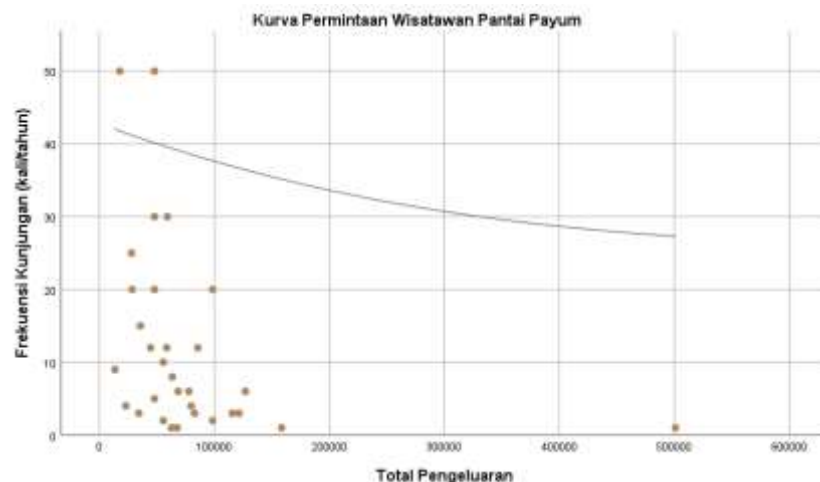


Figure 1. Tourist Demand Curve on Travel Costs to Payum Beach

3.2. The relationship between the length of visit and the frequency of visits

Data on activities that tourists usually do in Table 3 indicated that the main activities were recreation and taking pictures for “enjoying the atmosphere, such as enjoying the sunset, and recovering from stress during work. Regression analysis then shed light on these activities and found that length of stay (duration) had a positive significant effect which means that Visitors who engage in recreational activities (enjoying nature, taking pictures) will tend to stay longer because the longer they stay, the more emotionally attached they are to the place, which ultimately increases their desire to come back again in the future.

3.3. The Relationship Between Crowd Levels and Frequency of Visits

Crowds are also a factor that increases the frequency of visits to Payum Beach, and according to Table 2, a small percentage of tourists prefer the quiet, peaceful beach atmosphere. However, in general, Payum Beach functions as a social interaction space for the people of Merauke.

This is evident in the number of visitors who come in groups rather than alone to participate in beach activities. The results of the regression analysis strengthen this view: the crowd-level variable has a positive and significant Influence on the frequency of visits, indicating that a crowded atmosphere increases tourists’ interest in visiting again. Based on the regression results, although a small number of visitors seek tranquility, the overall crowd contributes to a positive experience of visiting Payum Beach. The lively, crowded atmosphere is not seen as a nuisance but as a means of social interaction that strengthens the beach’s function as an open space for all groups.

3.4. Beach Access Facilities for All Groups

Income, age, and education do not significantly influence visit frequency. This finding suggests that Payum Beach is accessible to visitors from different socio-economic backgrounds. The absence of a formal entrance fee and the relatively low travel cost strengthen the role of Payum Beach as an inclusive public recreation area.

Facilities and satisfaction were also not statistically significant. This indicates that repeat visits are not primarily determined by artificial facilities, such as cafes, toilets, or supporting infrastructure. Instead, visitors appear to be more strongly attracted by natural scenery, accessibility, affordability, and the social atmosphere of the beach.

Table 6. Respondent's Willingness to Revisit

Willingness to Return	Visitor Response (%)
Want to Visit Again	87,1
Not interested in visiting again	12,9

4. Valuation of Consumer Surplus

This regression model includes many independent variables, including income, age, and education, so it needs to be assessed for the Effective Constant. This constant represents the average potential for respondents' visits, assuming other variables remain constant. The consumer/consumer profit analysis is strongly influenced by income and mileage. (Rahayu & Haryati, 2022). Research results: Income level has no real effect. The results of our study are largely consistent with those from the study on Mansinam Island, which found that income, travel costs, and visit duration are similar. (Ajo et al., 2022). Meanwhile, travel costs that can be calculated by utilizing data are presented in Table 7.

Tabel 7. Koefisien B dan rata-rata data dari 31 Responden berdasarkan variabel sosio ekonomi

Variabel	Coefficient (B)	Average (X)	Multiplication Result (B×X)
Constant Awal	0,849	-	0,849
Revenue	$1,068 \times 10^{-6}$	3.335.484	3,562
Age	-0,190	32,52	- 6,179
Education	-2,339	2,97	- 6,947
Length of Stay	5,077	2,44	12,388
Entourage	0,066	4,81	0,317
Hygiene	-2,502	2,32	- 5,805
Facilities	1,882	1,48	2,785
Satisfaction	1,702	3,61	6,144
Crowd Level	6,790	1,55	10,525

$$a' = 0,849 + 3,562 - 6,179 - 6,947 + 12,388 + 0,317 - 5,805 + 2,785 + 6,144 + 10,525 = 17,639,$$

So that the request function is obtained as a formula:

$$Q = 17,639 - 0,00007034(P)$$

Where:

- Q = Number of visit requests (times/year).
- P = Travel Cost (Rupiah).
- 17.639 = Effective constant (a'), which shows the estimated number of visits if the cost of travel is zero, taken from the average of the variable.
- 0.00007034 = Travel cost regression coefficient (b), which indicates a negative number according to the law of demand.

Before calculating the consumer surplus, it is necessary to know the highest price point where the request for visits becomes zero ($Q=0$), or what is referred to as *the Choke Price*, as follows:

$$Q = 17,639 - 0,00007034P$$

$$P_{maks} = 17,639 / 0,00007034 = \text{Rp.}250.470$$

This value indicates that if the trip cost reaches Rp.250,470, the probability that an individual will visit Payum Beach is close to zero.

Consumer Surplus is calculated using a finite integral approach from the individual demand function, with the lower limit in the form of the lowest travel cost $P_{min} = \text{Rp } 13,500$ and the upper limit in the form of *Choke Price* (P_{max}) = Rp 250,470 with the following formula:

$$SK = \int_{min}^{maks} (a' - bP) dP$$

The mathematical valuation is as follows:

$$SK = (17,639P - \frac{0,00007034}{2} P^2)$$

Where the upper limit is IDR 250,470, and the lower limit is IDR 13,500, so that the SK can be obtained as follows:

- a. Upper Limit Substitution ($P = 250.470$):
 - 1) $SK = (17,639 \times 250.470) - (0,00003517 \times 250.470^2)$
 - 2) $SK = 2.211.698$
 - b. Lower Limit Substitution ($P = 13,500$):
 - 1) $SK = (17,639 \times 13.500) - (0,00003517 \times 13.500^2)$
 - 2) $SK = 231.717$
- Total Consumer Surplus: $2.211.698 - 231.717 = \text{Rp.}1.979.981$

Based on the valuation conducted, the estimated recreation value is Rp—1,979,981 per person per year for a visit to Payum Beach.

Based on the estimated economic value of visits, the total annual economic value has been calculated using the estimated number of visitors during Friday-Sunday afternoon peak hours, as presented in Table 8.

Table 8. Estimated Total Visitors to Payum Beach Per Week

Day	Observation Results (person/day)	Assumption of Similar Days	Hasil Pengamatan (orang/hari)	Asumsi Hari Sejenis
Monday–Thursday	9 (assumed Friday equivalent)	$4 \times 9 = 36$	9 (diasumsikan setara Jumat)	$4 \times 9 = 36$
Friday (October 16, 2025)	9	$1 \times 9 = 9$	9	$1 \times 9 = 9$
Saturday (October 17, 2025)	47	$1 \times 47 = 47$	47	$1 \times 47 = 47$
Sunday (October 18, 2025)	32	$1 \times 32 = 32$	32	$1 \times 32 = 32$
Total per week	124 people/week	6448 people/Year	124 orang/minggu	6448 orang/Tahun

Multiplying the decree value by the estimated annual number of visits (6,448) yields a total economic value of around Rp 12,766,917,488 per year for Payum Beach. This figure shows the economic benefit each visitor to Payum Beach receives above the costs they actually incur.

C. DISCUSSION

1. Analysis Results

The results of multiple linear regression analysis show several factors that affect the frequency of tourist visits to Payum Beach, which are as follows:

1.1. Cost Sensitivity

The variable Total Expenditure, in the form of Travel Expenses, shows a negative and significant Influence of the coefficient b on the frequency of visits, consistent with the law of demand (Mukhlis, Arifin, Ridwan, & Zulbaidah, 2025; Mukhlis, Arifin, Ridwan, Zulbaidah, et al., 2025). This finding also confirms the core assumption of the Travel Cost Method (TCM), namely that travel cost functions as an implicit price for accessing recreational services. In the coastal tourism context, this result is comparable to previous TCM studies which show that beach and coastal visitors are generally sensitive to transportation costs, entrance-related expenses, and opportunity costs of time. However, the Payum Beach case differs because the dominant visitors are local residents who travel relatively short distances and prefer low-cost recreation.. Factors that affect the demand for visits to Tuur Ma'asering Agrotourism include travel costs, income, education level, and group size. Factors that do not have a significant impact are distance traveled and age. (Arie et al., 2024) Meanwhile, the study found that distance traveled, travel costs, and education had less effect on them during repeated visits to Payum Beach. Price sensitivity is a prerequisite for over-exploitation, pollution, and climate change. Long-term double-effect costs, critical changes, and entry costs need to be shared fairly to motivate the visit and ensure adequate accessibility and security. (Skiniti et al., 2024).

1.2. Attraction and Duration of Visit

The factors of length of stay at tourist sites and crowd levels both have a positive Influence, as shown by positive and significant b coefficients on the frequency of visits. The positive Influence of long stays shows that recreational activities and enjoying nature are the primary reasons visitors form stronger emotional bonds and a stronger desire to return. There are also findings that crowds increase visits, strengthening Payum Beach's function as a space for social interaction. The use of TCM in tourism practice and policy offers practical insights for tourism planners, managers, and policymakers on how to balance economic development with environmental conservation and social well-being. A deeper understanding of TCM's role in contributing to shaping tourism Research and informing how sustainable tourism management practices should be. TCM studies provide valuable insights for stakeholders in various fields of academia, industry, and policymaking (Arya & Diswandi, 2024).

1.3. Accessibility and Openness for All Groups

Socioeconomic variables such as Income, Age, and Education were not statistically significant in predicting the frequency of visits. These results provide strong evidence that Payum Beach is a public recreation space for everyone, where economic or educational background does not limit access or the frequency of visits.

1.4. Tourism of Priority Natural Attractions

Although facilities on the beach were considered limited, regression analysis showed that the variables Facility and Satisfaction did not significantly affect visit frequency. This confirms that visitors' decision to return is not based on artificial facilities or infrastructure but is driven by the appeal of beautiful natural scenery, with the dominant reason among the respondents interviewed. It can also be seen that visitors do not prioritize beach cleanliness, as few tourists appear to do so. Willingness to Pay (WTP) has not been provided in a box to increase facilities such as garbage cans, and the number of toilets (Water Claus-WC) (Munawir et al., 2023). Therefore, future management should use WTP carefully as a complementary instrument, not as a justification for high entrance fees. Basic

improvements such as waste bins, toilets, safety information, and shaded seating can increase comfort while preserving the natural coastal character that forms the main recreational value of Payum Beach. Hopefully, in the future, with the WTP being able to provide facilities that make it possible to increase visits to Payum Beach

2. Policy Implementation

2.1. The Influence of Consumer Surplus on Regional Funding Policy

The consumer surplus from the TCM analysis indicates that the economic benefits of Payum Beach for the community are considerable. However, these findings cannot be used directly to set or increase the entry rate, because the consumer surplus in the TCM reflects the recreational value visitors receive rather than their willingness to pay the levy. The characteristics of visitors, dominated by local people with relatively homogeneous incomes and low-cost recreational destinations, indicate that ticketless accessibility is an important element of the social function of Payum Beach.

If the government wants to increase revenue for area management, the more appropriate approach is to develop a funding scheme that does not burden visitors, such as official parking levies, voluntary donation boxes, or CSR (Corporate Social Responsibility) funding cooperation (Mukhlis et al., 2024; Mukhlis, Maryam, et al., 2023). This approach allows the government to capture some of the economic value of the beach without reducing public access and still keeping Payum Beach as a public space open to everyone.

2.2. Development Focus on Basic Facilities

The focus of Payum Beach's development should be on improving basic facilities that support visitors' comfort without altering the beach's natural character. This is based on findings that the main attraction for tourists is the natural environment, while the variables Facilities and Satisfaction have no significant effect on visit frequency.

This indicates that the construction of artificial facilities or expensive entertainment rides will not increase visits and has the potential to damage the natural value of the beach which has been its main strength so that the development of facilities needs to be focused on basic and low-cost aspects, such as the provision of sorted garbage cans, the addition of public toilets, safety signs, information boards, and a seating and shaded area that takes advantage of natural shades such as trees. This Research can indirectly reveal the relationship between landscape areas and the economy, which is analyzed using TCM. (Çay & Taşlı, 2020).

Providing this facility will increase comfort and cleanliness without disturbing the beach environment, while strengthening the beach's function as a community recreation space that is safe, comfortable, and affordable, while maintaining the beauty of the environment.

2.3. Strengthening the Conservation of the Coastal Environment

The natural beauty of Payum Beach is the dominant attraction for tourists. However, the area's Economic Development Value is at risk of decline if environmental degradation occurs, such as abrasion and sand-digging activities reported along the Merauke coast (Mukhlis, Janwari, et al., 2023; Mukhlis & Abdullah, 2025). This is consistent with previous coastal TCM studies showing that beach erosion, waste accumulation, landscape damage, and declining water or sand quality can reduce recreational demand and consumer surplus.

2.4. Implementation of Payum Promotion as a Tourist Area

The analysis shows that the level of crowding has a positive and significant effect on the frequency of tourist visits, indicating that a crowded atmosphere encourages visitors to return because Payum Beach serves as a public recreational space for the people of Merauke. The descriptive findings also corroborate this: most tourists come to travel, gather, take pictures, and engage in social activities, so interaction between visitors is an important part of the visiting experience.

Based on these findings, the promotion of Payum as a Tourist Area should highlight its identity as a beach that caters to all levels of society and is natural, friendly, and enjoyable for everyone. Promotion does not need to focus on excessive commercialization or artificial entertainment, but should emphasize the beach's core values: natural beauty, easy access, low cost, and a lively social atmosphere. Payum promotion can be achieved by disseminating information to schools, local communities, and Micro, Small, and Medium Enterprises (UMKM) to highlight the beach as a place to gather, relax, and engage in safe, comfortable recreational activities.

3. Evaluation

This evaluation assesses the quality of the data obtained, the suitability and validity of the methodology used, and the Influence of the Research findings on the management of Payum Beach.

3.1. Evaluation of Data Quality in the Field

Data evaluation in the field provides information about the limitations and advantages of the data used, which are as follows:

a. Sufficiency and Representation of Samples

The study involved 31 respondents, which was considered adequate for linear regression analysis to assess the data's adequacy. Sampling was conducted randomly, using adult visitor criteria, and was limited to one respondent per group to avoid bias. Factors that affect the demand for visits to Tuur Ma'asering Agrotourism include travel costs, income, education level, and group size. Factors that do not have a significant impact are distance traveled and age (Arie et al., 2024).

b. Travel Cost Accuracy

Travel costs are calculated based on interviews and questionnaires, which involve estimating transportation costs, consumption, and the value of time sacrificed. Data accuracy is highly dependent on respondents' honesty and recall, which can introduce bias in cost reporting. The accuracy of travel costs is greatly influenced by the recreational use and handling of excavation C, which is not controlled by maintaining various facilities, and also by its uniqueness in attracting tourists. In Lake Tana, some areas need attention, such as the use of facilities, the disposal of uncontrolled waste, and the installation of information kiosks to attract visitors to the lake. (Wubalem et al., 2023).

c. Standard Time Values

The value of time sacrificed on the trip is calculated using the standard value of Rp. 17,000 per hour, calculated based on Merauke's minimum wage of Rp. 4,000,000, and although this simplifies the calculation, it may not fully reflect each respondent's actual time cost due to varying income levels. Wetlands play a fundamental role in maintaining the world's ecosystems, human health, and the value of ecosystem services. Therefore, wetland ecosystems need to be in TCM to obtain data and information on the estimated total economic benefits of tourism utilization. So that

the results of this TCM can provide support for decision-makers in the exchange of economic benefits generated in their use of both tourism and conservation activities in their wetland areas (Rusciano et al., 2023).

3.2. Methodology Evaluation

The methods used must be assessed based on their suitability with the location and objectives of the Research, which are as follows:

a. Choosing the Right Method

The use of the Individual Travel Cost Method (ITCM) is appropriate because ITCM is more accurate than *the Zonal Travel Cost Method* (ZTCM), given that the characteristics of visitors to Payum Beach are heterogeneous, ranging from those in the nearest areas to those in the farthest areas, with different income levels and visit frequencies. TCM is expected to be able to make a significant contribution to development in the socio-economic development of the people of Bunaken Island (Ajo et al., 2022) and the people of Payum Beach.

b. Validation of Economic Concepts

The regression model successfully captures the core concepts of TCM. The regression coefficient for the variable Total Expenditure (Travel Expenses) was negative and significant. These results validate that TCM can capture the *implicit price* of Payum Beach recreational services and confirm compliance with the Law of Demand.

c. Reliability of the Regression Model

The linear regression model is considered feasible and stable because there is no multicollinearity. All independent variables have VIF values below 5, ensuring that each variable provides distinct information and that the regression coefficients reflect the pure Influence of each variable. Variables that always affect the success of visits to tourist areas are influenced by travel costs and the number of days of visits in achieving them through TMC (Wibowo et al., 2021), and the number of tourists in increasing income to know the advantages of the region through TCM (Riantoro, 2022).

3.3. Evaluation of Findings in Research

The findings were evaluated based on the Influence of the findings on the policy, which are as follows:

a. Validitas Nilai Ekonomi

This economic value is considered valid because: (1) it is based on a statistically significant relationship between travel costs and frequency of visits where the cost coefficient is negative, according to demand theory, (2) reflects the social benefits enjoyed by visitors and (3) is consistent with TCM theory where consumer surplus describes the net recreational value that people receive from a tourist area (Mukhlis, 2025a; Mukhlis & Saidah, 2025). Resources for protection are allocated not only for ecological reasons but also for their recreational benefits. Some experts argue that nature-based ecotourism can be a sustainable mechanism to protect tropical rainforests. Practical recommendations for ecotourism include a minimalist approach, such as visitor regulations that limit access to a small number of large recreational areas and national parks to protect flora and fauna. In addition, this policy can apply entrance fees or services for the benefit of the Regional Original Revenue (PAD) of the Merauke district, South Papua Province. (Prochazka & Abraham, 2024).

b. Suitability of the Role of the Beach

The finding that the variables of Income, Age, and Education do not have a significant effect is a positive development that strengthens Payum Beach's role as a public recreation space open and fair to all, regardless of socioeconomic background. The importance of Payum Beach as an economic and recreational asset for the community can provide a policy basis for sustainable tourism development. The recommendation was submitted to the local government to improve accessibility and tourist facilities to maximize the economic potential of this tourist attraction. (Sukatno et al., 2025)

c. Conservation Priorities

The finding that the natural scenery factor is the main attraction and the Facilities factor is not significant indicates that the sustainability of Payum Beach's economic value is highly dependent on the quality of its natural environment. This evaluation suggests that coastal conservation should be prioritized to protect these core attractions from environmental degradation. In addition, the local government of Merauke Regency is supported by the South Papua Provincial Government to synergize TCM with valuation techniques to monitor and anticipate ecosystem changes resulting from damage to the conservation of an ecosystem (Sánchez Bardales et al., 2025).

CONCLUSION

A Cost-of-Profit Method (TCM) assessment of Payum Beach shows that the area's low or no entry fee is often mistaken for a sign of low economic value. The estimated consumer surplus of Rp 1,900,000 per person per year indicates that Payum Beach provides substantial recreational and environmental benefits to visitors. With an estimated 6,448 local tourists visiting the natural panorama, accounted for about 6 percent of the total tourist visits along the Arafura Sea coast in 2016, with a minimum cost of Rp. 79,522. This collectible environmental asset has significant value to every visitor every year due to its landscape. Based on this data and information, it can change the perspective of the Merauke district government and South Papua Province toward their natural assets as long-term investments. However, the results should be interpreted with caution because the study is based on a relatively small sample size and depends on several estimation assumptions used in the TCM approach. The study's results also show that tourist visits to Payum Beach are linked to the landscape and visitors' income.

CONFLICT OF INTEREST

A conflict of interest occurs when an organization or personal relationship, such as financial gain, personal interest, or a desire for successful outcomes, may influence an author's actions. Please provide a conflict of interest statement. If there is no conflict of interest, state that "The author(s) declare(s) that there is no conflict of interest."

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