

Eligibility of Providing Cruises on Lake Toba

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Abstract:- Lake Toba is one of the largest lakes in the world that has been approved by Unesco as a world heritage Geopark in 2020. As a geopark, Lake Toba has many tourist objects and destinations (ODTW) that combine nature and buildings, which will look even more beautiful when enjoyed from above. boat. One of the efforts to increase tourist attraction on Lake Toba is through the provision of cruise ships. The problem is that the cruise ship must be built on Lake Toba because Lake Toba is at an altitude of 905 meters above sea level. For this reason, it is necessary to study the potential number of tourists who are expected to use cruise ships and an estimate of the type and size of the ship that is made as to the basis for the feasibility of providing cruises on Lake Toba. By utilizing time-series data on tourist visits, and distributing questionnaires to tourists as well as purposive interviews to some tourism service entrepreneurs, and benefit-cost analysis (BCA) methods, it can be concluded that the potential for cruise ship passengers on Lake Toba is very large and feasible to provide a cruise ship, but still needed some improvements, especially regarding the issue of security and shipping safety and port facilities repairs.

Keywords:- Tourism Objects and Destinations, Water Tourism, Cruises, AloS, BCA.

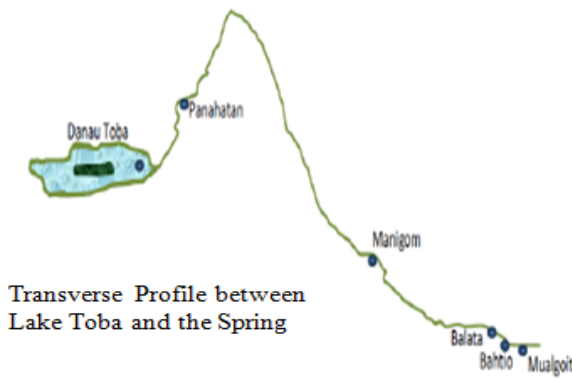
I. INTRODUCTION

Lake Toba with Samosir Island in the middle is one of the largest lakes in the world at an altitude of 905 meters above sea level, 143.5 Km from Kuala Tanjung Harbor as the nearest port, which has been approved by UNESCO as a world heritage Geopark in 2020. The beauty of Lake Toba will look more beautiful when enjoyed from the boat, cradled by the strains of the lake waves and the strains of traditional Batak music while enjoying the menu dishes available on the ship's service.

Tourist trips by boat on Lake Toba are generally carried out starting from the Ajibata tourist port located in Parapat city, Toba Samosir district, which is one of the gateways to Samosir Island. However, most of the visitors to Lake Toba complained about the lack of attractions in Lake Toba, especially those related to water tourism in Lake Toba. One of the efforts to increase tourist attraction on Lake Toba is by providing cruise ships. For this reason, it is necessary to study the potential number of tourists who are expected to use cruise ships as well as estimates of the type and size of the ship to be built, as a basis for the feasibility of providing cruises on Lake Toba. This needs to be done considering that Lake Toba is unique because it is impossible to bring in ships from outside, everything must be made by yourself on Lake Toba.



Figure 1 Lake Toba at North Sumatera Province, Indonesia



II. LITERATURE REVIEW

A cruise ship (cruise liner or cruise ship) by definition is a passenger ship used for cruise services. Passengers board a cruise ship to enjoy the time spent onboard the ship which is equipped with lodging facilities and equipment like a star hotel. Some cruise ships have shipping routes that always return to the port of origin of departure. The length of the cruise can vary from a few days to about 3 months [1]. Tourism using a cruise ship is a "choice" trip, which is strongly influenced by 3 factors, namely individual factors,

transportation system factors, and destination location factors[2]. This individual factor is in line with Consumer Behavior [3] which states that consumer behavior is influenced by cultural, social, and personal factors. For tourism, one of these personal factors is the individual's perception of the tourist attractions offered. Through a survey of perceptions of "state preference" to individuals who are visiting or have visited Lake Toba, it can be seen how much interest in cruise ship tours on Lake Toba, to estimate the size of the market opportunity for this cruise ship tourism if it is provided on Lake Toba. In addition, this market opportunity can also be identified through a survey of ship entrepreneurs on Lake Toba who have organized cruise ship tours even though in a very simple form. This survey was conducted using a purposive sampling technique[4][5], namely the technique of determining the sample with certain considerations under the desired goal. This sample is more suitable for qualitative research or research that does not generalize.

III. METHODOLOGY

This research step follows the stages as shown in Figure 2 below:

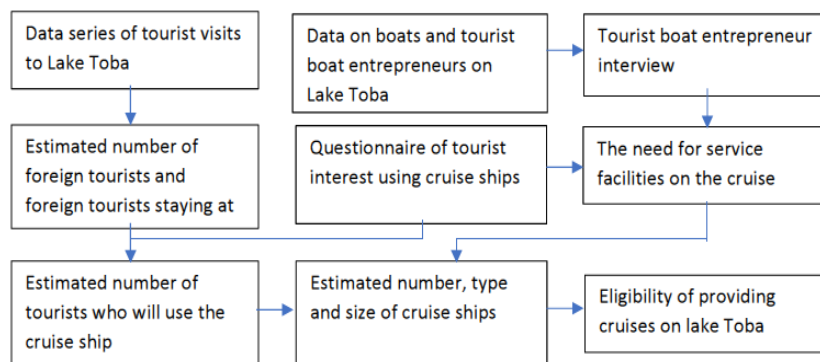


Figure 2 Flowchart of Potential Assessment of Cruise Ship Passengers on Lake Toba

The estimated number of tourists and the estimated number, type, and size of cruise ships needed are then analyzed using the Benefit-Cost Analysis method so that the NPV, IRR, and BCR values are obtained as considerations for the feasibility of providing cruises on Lake Toba:

IV. RESULT AND DISCUSSION

A. Ships Distribution on Lake Toba

Distribution of Vessels Operating on Lake Toba, as shown in the table below

Table 1 Distribution of Vessels Operating on Lake Toba

No	Regency	Number of Ships (unit)		
		Public Transport	Tourism Transport	Ferry
1	Toba Samosir	15	7	2
2	Samosir	116	9	2
3	Simalungun	31	28	1
4	Tapanuli Utara	4	-	-
Total		166	44	5

Explanation:

Tourist boats here are traditional ships that are specifically used for tourism purposes by way of rental or charter where the tariff determination is carried out on a price basis based on time or with a tourist attraction target.

Table 2 Specification and Types of Ships Operating on Lake Toba

Type	Type of Ship	GT	Function	Number (unit)	Height (m)
Passenger ship	Roll-on/Roll-off	200 s/d 500	Passenger Transport and R-2 and 4-Wheel Vehicles or More	5	8 – 10,5
Traditional Passenger Boats / tours	Kapal Kayu Tradisional	7 s/d 35	Passenger and motorbike transportation	208	9
Special Ship	Barges and Fishing Boats	< 100	-Industrial Owned Transport -Fishing Boat	2	9
Total				215	

Source: Toba ITMP survey results, 2018.

B. Potential Cruise Market in Lake Toba

Based on the results of the Toba ITMP survey in 2018[6], the estimated number of tourists visiting and staying at Lake Toba is as follows:

Table 3 Estimated number of International Tourists and Domestic Tourists visiting Lake Toba

Year	International	Domestic	Total	Length of Stay		Stay	
				International	Domestic	International	Domestic
2018	125.000	1.090.000	1.215.000	2,00	1,4	250.000	1.526.000
2020	260.000	1.150.000	1.410.000	2,30	1,7	598.000	1.955.000
2025	660.000	1.320.000	1.980.000	2,30	1,8	1.518.000	2.376.000
2030	1.200.000	1.590.000	2.790.000	2,40	1,8	2.880.000	2.862.000
2035	1.610.000	1.760.000	3.370.000	2,40	1,8	3.864.000	3.168.000
2040	1.820.000	1.990.000	3.810.000	2,40	2,0	4.368.000	3.980.000
2045	2.000.000	2.146.000	4.146.000	2,40	2,1	4.800.000	4.506.600

Table 4 Estimated number of tourists staying at Lake Toba

Year	People/Room		Stay Room		
	International	Domestic	International	Domestic	Total
2018	1,5	1,8	166.667	847.778	1.014.444
2020	1,5	1,8	398.667	1.086.111	1.484.778
2025	1,5	1,8	1.012.000	1.320.000	2.332.000
2030	1,5	1,8	1.920.000	1.590.000	3.510.000
2035	1,5	1,8	2.576.000	1.760.000	4.336.000
2040	1,5	1,8	2.912.000	2.211.111	5.123.111
2045	1,5	1,8	3.200.000	2.503.667	5.703.667

Assuming 10% of foreign tourists and 5% of domestic tourists who stay and will take a cruise, the estimated number of cruise ship consumers is as follows (1 year = 120 days):

To be able to meet this cruise market, cruise capacity should be 80-100 passengers. The minimum number of cruises is 2 units (1 operational and 1 as reserve).

Table 5 Estimated Potential Number of Tourists who will Use Cruise Ships on Lake Toba

Year	International	Domestic	Total	Potential Pax/day (120 days)	Potensi Pax/day (365 days)	Number of ship	Number of Trip/ day
2018	16.667	42.389	59.056	492	162	2	1
2020	39.867	54.306	94.172	785	258	2	2
2025	101.200	66.000	167.200	1.393	458	3	2
2030	192.000	79.500	271.500	2.263	744	4	2
2035	257.600	88.000	345.600	2.880	947	4	3
2040	291.200	110.556	401.756	3.348	1.101	4	3
2045	320.000	125.183	445.183	3.710	1.220	4	3

The results of a purposive [7] survey of cruise ship tours on Lake Toba (2019) to ship entrepreneurs and owners of the Sumber Sari Port (Tomok Port, Samosir Regency), stated that there was quite a large number of enthusiasts on a cruise around P. Samosir. The traveling route is Sumber Sari Port (Tomok) back and forth, through the Tano Ponggol bridge using a tourist boat (people) with a capacity of 100 passengers, with a long journey of 6-7 hours and a cost of 8 million / trip, always filled by domestic tourists. which generally come from outside P. Samosir.

From the description above, based on market considerations, it is better to prioritize a large number of ship frequencies, with not too many passengers, so that tourists will get better comfort (Compilation of survey results on cruise ship tours on Lake Toba, 2019)[8]. Operational options:

- Long Trip: > 6 hours (Stay)
- Short Trip: 1-2 hours (Ho-Ho)

For long trips (stays), the ship's design must adjust by providing rooms to stay like in a hotel (one room for 2-4 passengers). Thus the completeness (facilities) of the ship is adjusted to its operating plan.

C. Facilities and Ship Size

Based on market considerations, it is preferable to increase the number of service frequencies with the number of passengers that are not too many, so that tourists will get better comfort.

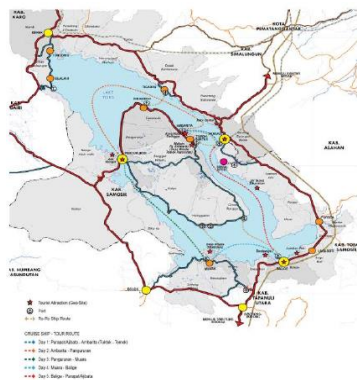
Operational options:

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For long trips (stays), the ship's design must adjust by providing rooms to stay like in a hotel (one room for 2-4 passengers). Thus the completeness (facilities) of the ship is adjusted to its operating plan.

For Long Trips, ship equipment:

- | | |
|----------------------------------------------|-----------------|
| Bedroom (+toilet) | 7. Crew room |
| Shared room (concurrently dining room) | 8. Pavilion |
| Special room (Karaoke, Billiard, Gym, etc.). | 9. Water tank |
| Floor View | 10. Fuel Tank |
| Public Toilet | 11. Engine Room |
| Kitchen | 12. Warehouse |



1. (Day-1) Parapat to Ambarita, change to Land Public Transport to visit Tourism Villages, and Cultural Attractions (Sidabutar Tomb/Tomok Pasaroan Tourism Village, Huta Siallagan)
2. (Day-2) Return by boat to the northern part of the lake (Batu Hang + Panorama), surround and end at Pangururan (stay and visit Aek Rangat)
3. (Day-3) Continue the journey by boat to Muara and stay at Sibandang Tourism Village
4. (Day-4) Continue to Balige to enjoy Urban Heritage Tourism
5. (Day-5) Return to Parapat exploring the 'Strait'/ waters to the east

Figure 3 Example Long Trip

For Short Trips, boat equipment:

- | | |
|----------------------------------------|----------------|
| Shared room (concurrently dining room) | 6. Pavilion |
| 2. Floor View | 7. Water tank |
| 3. Public Toilet | 8. Fuel Tank |
| 4. Kitchen | 9. Engine Room |
| 5. Crew room | 10. Warehouse |



1. (H-1) Parapat to Ambarita, change to Land Public Transport to visit Tourism Villages, and Cultural Attractions (Sidabutar Tomb/Tomok Pasaroan Tourism Village, Huta Siallagan)
2. (H-2) Return by boat to the northern part of the lake (Batu Hang + Panorama), surround and end at Pangururan (stay and visit Aek Rangat)
3. (H-3) Continue the journey by boat to Muara and stay overnight at Sibandang Tourism Village
4. (D-4) Continue to Balige to enjoy Urban Heritage Tourism
5. (H-5) Return to Parapat through the 'Strait'/ waters to the east

Figure 4 Example Short Trip

D. Choice of Ships

The choice of cruise ship design depends on the characteristics of the services and facilities provided, whether for Long Trip cruises or Short Trips [1], which are as follows:

1. Long Trip

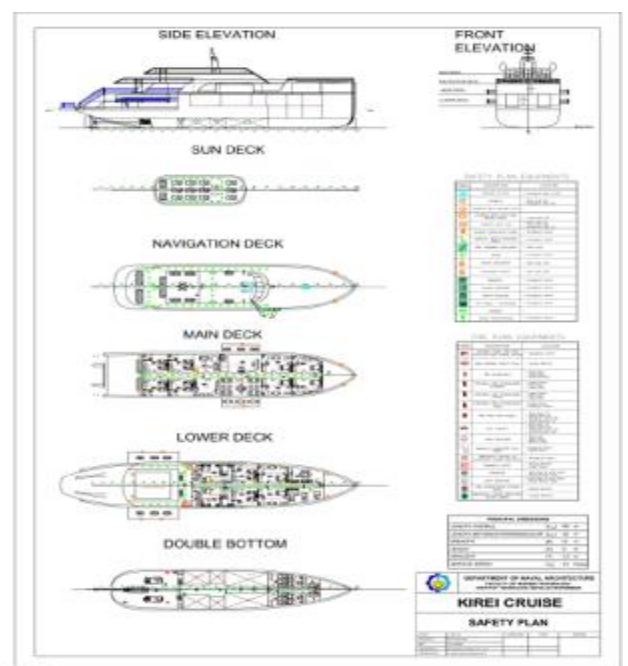


Figure 5 An Example Design of a Long Trip Cruise Ship

Type	Tourist Boat
Dimension	Legth 52 M, Wide 11,50 M, Height 9 M, Draft 4,5 M
Material	Steel
Weight	100 GT
Engine	Main Engine Yanmar 6AYEM-GT 749 kW Auxiliary Engine C32ACERT-GT 590 kW
Speed	Max 10 Knots
Capacity	50 Pax

2. Short Trip



Figure 6 An Example of a Short Trip Cruise Ship

Type	Water Bus
Dimension	Legth 21,5 M, Wide 7,50 M Height 9 M, Draft 4,5 M
Material	Wood
Weight	11 GT
Engine	2 x 100 HP
Speed	Max 7,5 Knots
Capacity	60 Pax
Owner	Government of Kab.Samosir
Operation	Since 27-12-2017
Route	Tongging (Kab. Karo), Parapat (Kab. Simalungun), Balige (Kab. Toba Samosir), Muara (Kab. Tapanuli Utara)

3. Safety Factor Requirements[9][10]

Based on the regulation of the Minister of Transportation of the Republic of Indonesia PM No. 129/2016[11], the height of the ship must pay attention to the safety factor of at least 1 meter to the building above it. Thus the height of the cruise ship to be made should not be more than 15 meters from the surface of Lake Toba. This happens because it is limited by the height of the Tano Ponggol bridge

that will be passed by the cruise ship. The Tano Ponggol Bridge is a bridge that connects Samosir Island with the mainland of Sumatra Island.

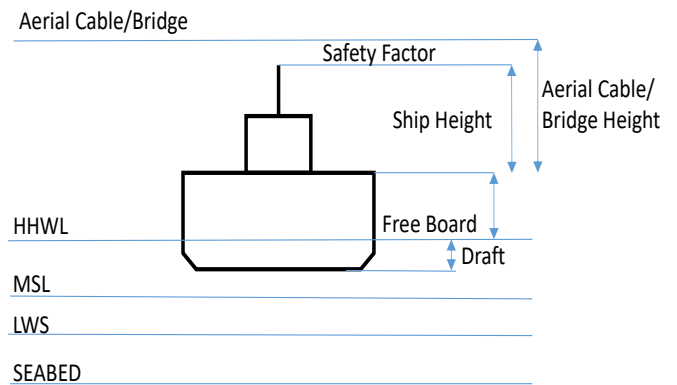


Figure 7 Procedure for Calculation of Clearance of Air Duct Cables/ Bridge.

$$\text{Aerial Cable and/or Bridge Height} = (\text{HHWL} + \text{TM}) + \{(\text{HHWL} + \text{TM}) \times \text{Fk}\}$$

$$\text{TM} = \text{SM} + \text{TK} + \text{M}$$

- : High Highest Water Level
- : Maximum height of ship (m)
- : Free board + draft (m)
- : Mast height (m)
- : Crane height (m)
- : Safety Factor 10%

E. Feasibility Analysis

Table 6 Feasibility of one-day trip cruise services

	Income		Expenditure
Fair	1.000.000	Ship Price	15.000.000.000
Pax/ day	80	Crew salary/ month	5.000.000
effective days/year	120	Number of crew	60
Income/year	9.600.000.000	Personnel costs/year	3.600.000.000
		OM Ship/ year	1.200.000.000
Income	Expenditure	Price gap	Cumulative
0	15.000.000.000	- 15.000.000.000	
9.600.000.000	4.800.000.000	4.800.000.000	- 10.200.000.000
9.600.000.000	4.800.000.000	4.800.000.000	- 5.400.000.000
9.600.000.000	4.800.000.000	4.800.000.000	- 600.000.000
9.600.000.000	4.800.000.000	4.800.000.000	4.200.000.000
9.600.000.000	4.800.000.000	4.800.000.000	9.000.000.000
9.600.000.000	4.800.000.000	4.800.000.000	13.800.000.000
9.600.000.000	4.800.000.000	4.800.000.000	18.600.000.000
9.600.000.000	4.800.000.000	4.800.000.000	23.400.000.000
9.600.000.000	4.800.000.000	4.800.000.000	28.200.000.000
9.600.000.000	4.800.000.000	4.800.000.000	33.000.000.000
		NPV	Rp13.176.334.687
		IRR	40%
		PP	4

Table 7 Feasibility of 4 hours trip cruise services

	Income		Expenditure
Fair	150.000	Ship Price	7.000.000.000
Pax/ day	160	Crew salary/ month	5.000.000
effective days/year	120	Number of crew	20
Income/year	2.880.000.000	Personnel costs/year	1.200.000.000
		OM Ship/ year	400.000.000
Year	Income	Expenditure	Price gap
0	0	7.000.000.000	- 7.000.000.000
1	2.880.000.000	1.600.000.000	1.280.000.000
2	2.880.000.000	1.600.000.000	1.280.000.000
3	2.880.000.000	1.600.000.000	1.280.000.000
4	2.880.000.000	1.600.000.000	1.280.000.000
5	2.880.000.000	1.600.000.000	1.280.000.000
6	2.880.000.000	1.600.000.000	1.280.000.000
7	2.880.000.000	1.600.000.000	1.280.000.000
8	2.880.000.000	1.600.000.000	1.280.000.000
9	2.880.000.000	1.600.000.000	1.280.000.000
10	2.880.000.000	1.600.000.000	1.280.000.000
			NPV
			Rp786.412.257
			IRR
			13%
			PP
			6

V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

The market for operating cruises as tourism products on Lake Toba is very large, both for foreign tourists and domestic tourists. Financially, the provision of this cruise ship is also profitable, as shown by the results of CBA for long trip service (1-day cruise) obtained NPV IDR 13.176.334.687, with 40% IRR and Payback 4 years, while for short trip service (4 hours cruise)) obtained NPV IDR

786.412.257, with IRR 13% and Payback Period of 6 years. For the selection of the size of the cruise ship, following with the Regulation of the Minister of Transportation of the Republic of Indonesia No. PM 129/2016 concerning Shipping Lines at Sea and Buildings and/or Installations in Waters, and Ministerial Regulation No. PM 68/2011[12] concerning Sailing Routes, it is recommended that the maximum height of the ship be made 15 meters from the water level of the lake. The consequences of cruise ship visits to ports are the need for adequate parking spaces/areas at

each port, access roads to the port and district roads to tourist attraction locations around the port, as well as public transportation services (electric tour buses, bicycles, or electric motorcycles).

5.2 Recommendations

- Communication with local communities, ship owners, and managers of attractions around the port
- Interpreters for 'story telling', and geo-interpreters with senior tourist guides
- Training of frontline and other crew members
- Signage & interpretative information on geo-sites
- Brochures for tourists on board and promotional materials
- Safety and security measures
- Operational/licensing regulations

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