Development of Ecotourism Floating Restaurant in Surabaya City

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Abstract. In the 18th century, Kalimas's river serves as a workspace, marketing space, and transportation routes for residents of Surabaya. Although the current condition of Kalimas river has changed a lot, but Kalimas's river has good potential of water tourism and transportation facilities. Therefore, the Surabaya city government setup a policy to revitalize the Kalimas's River. The submarine monument area as one of Surabaya's landmarks next to Kalimas's River will be developed as a 'Riverside Center Business Center'. One feasible way to support the city government program is the development of a floating restaurant. Floating restaurant is just a place to eat, when doing business negotiations or family tours. The concept of floating restaurant development based on ecotourism. Hence, this restaurant is designed environmentally friendly, empowering local people, and become a means of learning and education. The eco-friendly concept is manifested in a flat outward-side asynchronous catamaran form and battery-based electric propulsion systems and solar panels. The menus are provided by local vendors along the river bank of Kalimas so the local food supplier will be more empowered.

1 Introduction

Surabaya's past is a centre for meetings between traders from various corners of Java island with merchants from east and west. At that time, Kalimas's river serves as a workspace, marketing space, and transportation routes for residents of Surabaya [1]. But the role has now been degraded, due to the development of a city focused on land. Whereas Kalimas's river has the potential of water tourism and transportation facilities are very large. Recognizing the hidden potential of the Kalimas River, the Surabaya city government made a policy to revitalize the Kalimas River. The submarine monument or monkalsel area as one of Surabaya's landmarks next to Kalimas River will be developed

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as a 'Riverside Center Business Center'. One feasible way to support the city government program is the development of a floating restaurant. Floating restaurant is just a place to eat, when doing business negotiations or family tours.

The concept of floating restaurant development based on ecotourism. Hence, this restaurant is designed environmentally friendly, empowering local people, and become a means of learning and education. The eco-friendly concept is manifested in a flat outward-side asynchronous catamaran form and battery-based electric propulsion systems and solar panels. This floating restaurant is just a place to eat and meetings, where food is obtained from food vendors along the Kalimas's river, so that food traders are more empowered and create new jobs.

2 Eco-Friendly Floating Restaurants

Floating restaurant development in submarine monument area based on existing floating restaurant design. The characteristics of the floating restaurant design are as follows:

1. Beautiful appearance
2. High level of stability and low rolling motion
3. Low waves generated by the movement of the ship must be as small as possible (low wash displacement craft) in order to minimize the erosion caused by wave wash because the river wall prone to landslides [2].
4. To have the capacity and dimensions that corresponds to the depth of the river, so that food traders are more empowered and create new jobs
5. Silent and low vibration

The characteristics of the floating restaurant is manifested by a catamaran boat that has the form of hull flat side outwards (FSO) with electric propulsion. This form of floating restaurant has several advantages as follows [3-6]:

- a large number of choices of types and shapes with various characteristics;
- Wider deck area.
- more or less high seaworthiness
- required initial stability without restriction of hull aspect ratio
- water-resistant volume above water
- the possibility of slamming the wet deck;
- considerable influence of the external charge across the force
- low wash characteristics boat

Based on the condition of the Kalimas river and requirements the main dimension of the flat side outwards catamaran boat is

- $L_{overall}$: 7,0 m
- $L_{waterline}$: 6,0 m
- $B_{overall}$: 2,8 m
- $B_{demihull}$: 0,79 m
- Depth : 0,5 m
- Draft : 0,29 m
- Displacement : 1,927 ton

And the electric propulsion of the flat side outwards catamaran boat consists of electric outboard motor 500 W, 26 solar panels 80 WP and 10 battery 100 AH [7]. The 3D design of floating restaurant is shown in Figure 1.

Fig. 1. The 3D design of floating restaurant

3 Methodology

The basic material of this environmental friendly floating restaurant is fiberglass. So the analysis of feasibility study of development is based on fiberglass material. The methodology in the feasibility study analysis is divided into three stages, as follows:

Fig. 2. Lines plan of eco-friendly floating restaurant

3.1 Design of eco-friendly floating restaurant

The design of eco-friendly floating restaurant has a flat side outwards catamaran hull. Flat side outwards catamaran hull has less resistance than monohull or standart catamaran hulls. The other advantage of FSO catamaran has low wash characteristics, therefore the hull is very suitable for floating restaurant in Monkasel area. The lines plan of floating restaurant is shown in Figure 2 and the frame construction can be seen on Figure 3.

Fig. 3. Construction design of eco-friendly floating restaurant

3.2 Estimation of production cost

Cost components incurred in constructing fiberglass vessels are the cost of hull and construction, miscellaneous equipments, and other expenses. The cost components are listed the Table 1.

Table 1. Hull and Construction

No	Material	Number	Price
Hull and Construction			
1	Resin	3 drum	16,537,500
2	Catalys	1 kg	60,000
3	CSM 450 g/m2	7 roll	5,460,000
4	WR 600 g/m2	6 roll	5,640,000
5	Cobalt	1 kg	130,000
6	Wax	4 cans	374,000
7	Putty	7 cans	595,000
8	Pigment	2 kg	120,000
9	Foam	14 sheets	4,200,000
10	Mixed gel coat	152 kg	5,700,000
11	PVC Pipe 2 Dim	4 unit	608,000
12	Railing Stainless	3 m	1,200,000
13	Others		3,000,000
Equipments			
1	Handwash unit	1 unit	250,000
2	Table	1 unit	200,000
3	Passenger chair	10 unit	2,500,000
4	Pilot chair	2 unit	500,000
5	Manual Steering Rotary	1 set	3,500,000
6	Communication Radio VHF	1 set	2,500,000
7	Lamps	1 set	1,000,000
8	Electric Outboard Engine 0,5 kW	1 unit	66,240,000
9	Solar Cell 80 wp	26 unit	30,160,000
10	Battery 200 Ah	5 unit	20,000,000
12	Inverter 1000 Watt	2 unit	16,440,000
13	Mooring line	20 m	590,000
14	Bolder Stainless 3 inchi	1 unit	670,000
15	Life Jacket Standart SOLAS	8 unit	1,400,000
Miscellaneous			
1	Outfiting & Finishing	1 Package	10,000,000
2	Man hour	5 Package	10,000,000
3	Delivery cost	1 Package	5,000,000
Total cost			214,574,500

3.3 Estimation of ticketing price

The calculation of the ticket price of each passenger floating restaurant is based on several assumptions as follows:

- Passengers per trip is assumed to be only 5 passengers from a capacity of 8 passengers
- Trips per day are assumed 8 trips
- Hours per trip is assumed 30 minute
- The day of operation in one year is assumed to be 345 days

The initial cost is assumed using 50% owner capital and 50% bank loan, the economic life time of the vessel is 10 years. The maintenance cost considered to be low or close to zero since there is no fuelled engine and the life time of the vessel is only 10 years. The economic feasibility calculation is using NPV concept with several variations of minimum attractive rate of return (MARR) and margin. The margin is profit gained from the difference of return compared to MARR. The saving and loan interest rate are taken from the public bank and the inflation is taken from the data published by the government.

While the assumptions of economic data used are as shown in Table 2.

Table 2 Economic Data

Production cost of the vessel		
Ship price	Rp 214,574,500.00	
Operating costs		
Crew salary	Rp 48,150,000.00	per year
Maintenance and repair	Rp -	per year
Administration cost	Rp -	per year
Insurance	Rp -	per year
Total Operating Cost	Rp 48,150,000.00	per year
Financial Cost / Capital		
Loan term	5	Year
Payment per year	1	times per year
Equity	Rp 107,287,250.00	50%
Debit	Rp 107,287,250.00	50%
Interest Savings / Year	3.75%	per year
Interest Rate / year	10%	per year
Inflation	0.19%	per year
Economic duration of ships	10	years

The ticket price is calculated by using a software or Goal Seek and the result is shown in Table 3.

Table 3 Graphic analysis of sensitivity and NPV

MARR	Margin	Ticket price		Inflation	NPV
3.75%	0.00%	Rp 7,370	/ passenger	0.19%	Rp 14,295,720
7.73%	3.98%	Rp 7,625	/ passenger	0.19%	Rp 32,655,015
11.73%	7.98%	Rp 7,907	/ passenger	0.19%	Rp 52,914,741
15.73%	11.98%	Rp 8,213	/ passenger	0.19%	Rp 74,885,320
19.74%	15.99%	Rp 8,540	/ passenger	0.19%	Rp 98,328,835
23.74%	19.99%	Rp 8,884	/ passenger	0.19%	Rp 123,028,982
27.74%	23.99%	Rp 9,243	/ passenger	0.19%	Rp 148,797,648
31.74%	27.99%	Rp 9,614	/ passenger	0.19%	Rp 175,472,050
36.00%	32.25%	Rp 10,021	/ passenger	0.19%	Rp 204,695,947

Based on the variations it can be concluded that the ticket price and NPV are increase along the increase of margin and MARR as can be shown in Figure 4.

Fig. 4. Ticket Price vs margin (left) and NPV vs MARR (right)

Based on the ticket price data in Table 3, if the ticket price is set at Rp. 10.000,00 per person, obtained

- IRR is 36%, 32.25% higher than the prevailing savings rate
- BEP will be achieved in year 3

Therefore, floating restaurant investment in Kalimas river Surabaya has a very profitable long-term prospect.

4 Conclusion

Based on the feasibility study result, the development of floating restorant in Kalimas’s river has high prospect. The ticket price per passenger is only Rp. 10.000,00, so it is very affordable by the people of Surabaya. Where with the low ticket prices, generate IRR 36% and BEP in the third year.

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References

- [1] R. Hastijanti, "Developing River Lane as an Alternative for Water Tourism Destination — Case Study: 'Kalimas' River Lane of Surabaya, Indonesia," in *KKU International Engineering*, 2014, vol.931, pp. 781–784 (2014).
- [2] T. Whittaker, A. Bell, K. M. Morton, M. Shaw, K. Patterson, and M. Surveyor, "An investigation of fast ferry wash in confined waters," in *RINA International Conference on Hydrodynamics of High Speed Craft*, 1999, p. 13. (1999).
- [3] O. Yaakob, M. Afifi, A. Mukti, A. Nasirudin, "A Low Wash Hullform and Pollutant Free Inland Waterways Leisure Craft,Advan. in Maritime and Naval Scie. and Eng., Constantza, Romania (2010).
- [4] O. B. Yaakob, "The wake wash prediction on an asymmetric catamaran hull form,"1st Intern. Conf. on Natural Resources Eng. and Tech., Putrajaya, Malaysia (2006).
- [5] O. B. Yaakob, M. Afifi, A. Nasirudin, A. Mukti, A. Arizam, A. Wahab, Hull form configuration study of a low wake wash catamaran leisure boat", 2nd Intern. Conf. on Marine Research and Transportation, Naples, Italy (2007).
- [6] O. B. Yaakob, A. Nasirudin, M. P. Abdul Ghani, T. Mat Lazim, M. A. Abd Mukti, M. Ahmed, "Parametric study of a low wakewash inland waterways catamaran,Sci. Iran., 19, 3, Juni (2012).
- [7] E. S. Koenhardono, "Design of Eco Friendly Floating Restaurant for River" The 3rd International Seminar on Science and Technology, Surabaya (2017).