Indonesian Vocational Research Journal
ISSN 2828-5719, E-ISSN 2829-1883
Vol. 4, No.2; 2025
Published by Vocation and Certification Unit of UMG

Design of Floating Tourism Boat Using Barge Hull as Tourism Support in Ngipik Lake Gresik

Firman Rusdiansyah
Ship Construction Engineering Study Program, Faculty of Engineering,
Muhammadiyah University of Gresik
firmanrusdiansyah15@gmail.com

Received: June 24, 2025 Accepted: June 27, 2025 Published: June 30, 2025

Abstract

Gresik Regency is one of the Indonesian regions in East Java that has potential in the field of tourism that can be developed. Ngipik Lake is one of the attractions located in the center of Gresik. This final project intends to design a barge as a floating tourism so that later it can be a reference for ship owners regarding the conversion of barge functions and function as a reference for the development of Lake Ngipik tourism as an alternative tourist destination. The design process in question includes determining the main size of the ship which is adjusted to the rides and facilities in this floating tour, as well as determining the electricity needs as well as LWT and DWT components. From the technical analysis process, it was found that the appropriate size for floating tourism is L= 28.7 m, B= 16.4 m, H= 3.12 m, T= 2.12 m with a capacity of 250 people. Safety *plan design* with the addition of 255 *lifejackets and* 12 *lifebouy.*

Keywords: Design, Ngipik Lake, Barge, Floating Tourism

1. Introduction

Barges /*tong-kang/* n boats are quite large (to transport goods and so on) (KBBI). *Deck cargo barge* or barge is a type of ship with a flat hull or a large box that floats, used to transport goods and towed by *tugboat* Marjali, M. (2023). Barges themselves do not have a propulsion system like ships in general. In general, barges are used to transport large amounts of cargo such as wood, coal, sand, and others. However, nowadays there are many *tugboats* and barges that are traded or rented in Indonesia Prayogo, D. A., & Kurniawati, H. A. (2019). This cannot be separated from the reduction of natural resources because too much is taken and processed into other forms. This phenomenon makes a number of *tugboats* and barges in a number of regions in Indonesia end up in *scrap* machines. This is very unfortunate considering that the price of barges is not cheap, which ranges from 22-24 billion. With this incident, many ship owners produce barges for other purposes that are more useful and profitable, for example as a ship block carrier, restobarge, floating fish port, floating power plan facilities, etc. Prayogo, D. A., & Kurniawati, H. A. (2019)

Gresik Regency is one of the Indonesian regions in East Java that has potential in the field of tourism that can be developed. Ngipik Lake is one of the attractions located in the center of Gresik. Actually, the name of this lake is Giri wana tirta Abidin, R. (2013). but the surrounding community calls it Ngipik lake because it is located close to Ngipik village. The name giri is taken from the name of Sunan Giri's greatness. Wana which means to play while tirta is water. From the name it is true because this tour offers a view of lake water. Many plants and trees grow in the area of the Ngipiki lake. So that it makes the area look shady and cool. There is also a playground for children and a place to relax. Local residents often take advantage of this lake to relax during the holidays. But it takes a lot of development of the lake area to bring in more visitors.

Responding to the problems mentioned above, the author has a discourse outlined in this Final Project, namely to create a floating tourism concept using the hull of a barge as a support for tourism in Lake Ngipik.

2. Literature Review

2.1 Tourism

Tourism is the activity of temporarily moving people to destinations outside their place of residence and work and carrying out activities while at the destination and also the preparation of facilities to meet their needs. Tourism facilities and infrastructure are one of the indicators of tourism development. Facilities or infrastructure can be interpreted as an unhindered process of procurement and also the improvement of hotels, resorts, entertainment venues and so on as well as road and transportation infrastructure that is smooth and can also be affordable for tourists Hidayat, M. T. (2023).

2.2 Ngipik Lake

Ngipik Lake is one of the attractions located in the center of Gresik. Actually, the name of this lake is Giri Wana Tirta. but the surrounding community prefers to call it Ngipik Lake because it is located close to Ngipik village. the name Giri is taken from the name of Sunan Giri's greatness. Wana which means playing while Tirta is water. From the name, it is true because this tour offers a view of the water of Murtadho lake, A. A. (2021). Many plants and trees grow in the area of the Ngipiki lake. So that it makes the area look shady and cool. There is also a playground for children and a place to relax. Local residents often take advantage of this lake to relax during the holidays. The location of Lake Ngipik is located in the area of the Petrochemical fertilizer factory. Initially, the occurrence of this lake according to information from the surrounding community began with land used by PT. Semen Gresik as a mining location for clay raw materials, in line with the time after the exploration is completed, then filled with rainwater, which over time forms a lake with an area of about 20 hectares with a depth of 2 meters to 3 meters during the dry season and 4 meters to 6 meters during the rainy season Auliyaa, F. P., Pranata, M. H., & Firdha, N. D. (2025).

2.3 *Barge*

A barge is a *flat bottom* ship that does not have its own propulsion system which is commonly used as a transportation of goods in the sea, river or canal. Once upon a time, barges were made of wood, nowadays all barges are made of *welded steel.* The classification of barges consists of several types, namely:

- *Deck Cargo Barge*
- *Tank Barge* atau *Liquid Cargo Barge*
- *Car Barge* atau *Car float*
- *Accomodation Work Barge*

2.4 Design Process

The design process is a process that is carried out repeatedly to produce a design that is in accordance with what is desired. In the design process of building new ships, there are several design stages, including Sugianto, Y. (2020):

1) *Concept Design*
2) *Preliminary Design*
3) *Contract Design*
4) *Detail Design*

3. Research Methodology

3.1 Research Materials

The research material in question includes primary and secondary data as well as theories and references that are the basis for this research by obtaining and collecting data to support the research. Both from magazines, websites, journals and existing scientific works.

3.2 Data Analysis and Processing

Data processing and analysis is carried out using the AutoCAD software computer program. Data processing begins with determining the main size of the vessel, making a general arrangement and making a safety plan design.

3.3 Flow Chart

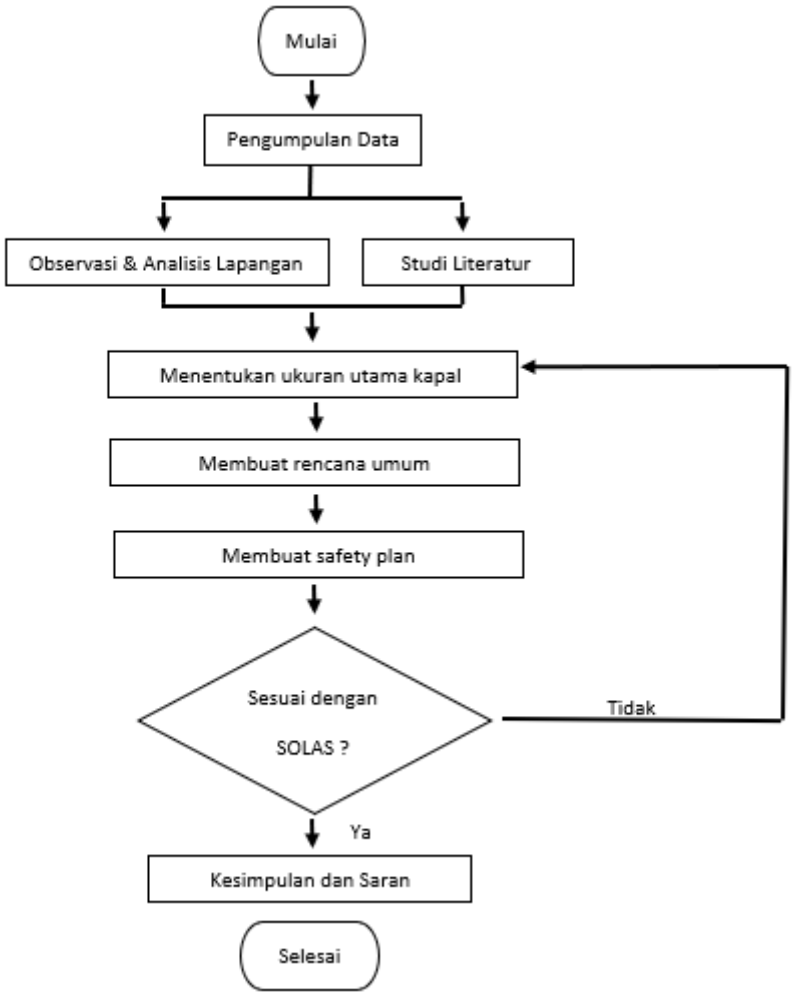

Figure 1. Flow Chart

4. Result and Discussion

4.1 Analysis of the number of visitors

The number of tourist visits to Gresik fluctuated throughout 2016 to 2022. In particular, there was a significant decline in 2020 and 2021, which can be attributed to the impact of the COVID-19 pandemic. However, in 2022, there was a considerable surge in the number of visitors, indicating the recovery of the tourism sector in the area, according to the Gresik Regency Tourism and Creative Economy, Culture, Youth and Sports Office. (2023).

4.2 Determination of the Main Size of the Vessel

This ship is designed to be able to accommodate visitors of around 250 – 300 people, supported by data from the SNI 03-1733-1989 open space facility, about environmental planning procedures in obtaining a ship area of 500 m3 of the National Standardization Agency. (2004). Furthermore, from the data obtained, the author drew the initial layout of the Ngipik Lake Floating Tourism of Soekresno and Pendit, (1998). Based on the existing data and referring to the areas above, the author further describes the initial layout of the design to be made, as follows:

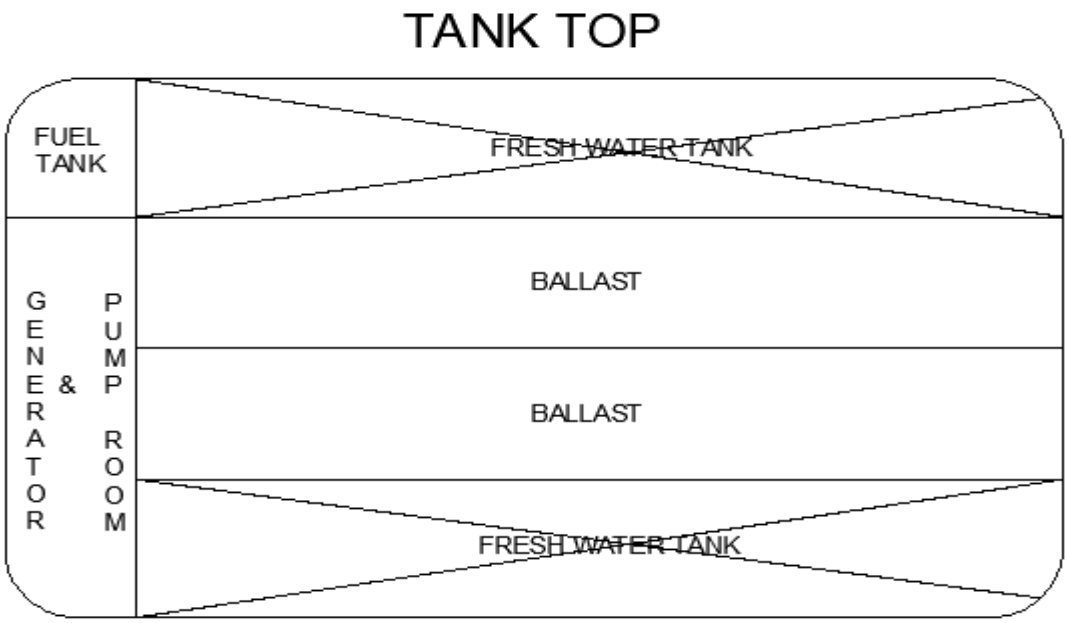

Figure 2. Ship payload

After drawing the initial layout, the author looked for references to the area of the Ngipik Gresik lake to find out the height of the ship and the appropriate load. Furthermore, the main sizes of floating tourism are:

- L : 28.7 m
- B : 16.4 m
- H : 3.12 m
- T : 2.12 m

4.3 General Arrangement

The creation pf the General Arrangement it self uses AutoCAD 2012 software. General Arrangement is made as a planning of the room needed according to the function and equipment of the ship. The result of the general plan can be seen in figure 3.

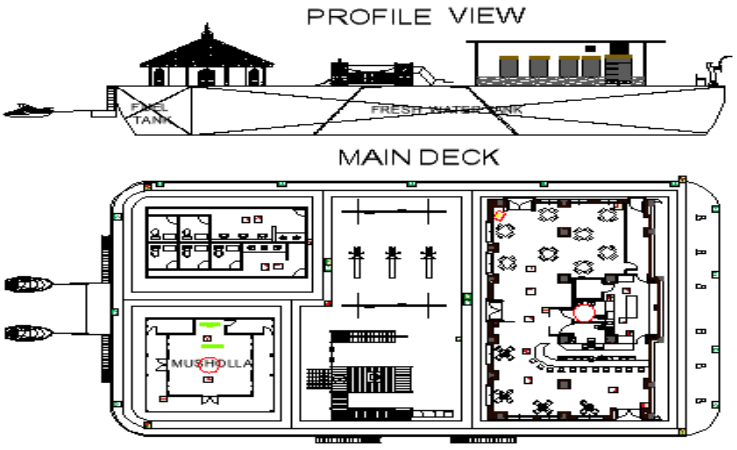

Figure 3. General Arrangement

4.3.1 Facilities at Floating Lake Ngipik Tourism

Visitors to Ngipik Lake are dominated by young people and children to play, there are also water sports that can be used in the Ngipik Lake, along with the facilities in the Ngipik Lake floating tourism :

- Playground
- Coffee
- Prayer room and toilets
- Fishing area
- Water skiing
- Speed boat

4.3.2 Ship Weight Calculation

The calculation of the weight of the ship is divided into two, namely *lightweight* (LWT) and *deadweight* (DWT). *Lightweight* is the weight of an empty ship without a cargo which means it only consists of the weight of the ship's structure, the weight of the machinery installation, and the weight of the ship's equipment itself. *Deadweight* is the weight of the ship's cargo that will be carried during the trip, which consists of *payload*, engine fuel, crew needs, and clean water. For the calculation of the LWT of this ship, it was obtained of 711,065 tons and the calculation of the DWT of the ship was obtained of 454.6 tons.

4.3.3 Tank Calculation

The *diesel oil capacity* for this ship is taken from the fuel consumption of the generator set engine only because it does not use the main engine. The number of tanks used is 1 piece located under the *main deck*. The fuel used is industrial diesel or B30/B35 with purchase using a trailer truck tank with a capacity of 8000 liters for use for 2 months for floating tourism of Ngik lake. It has dimensions of 3.7m long, 4m wide and 2m high with a volume of 29,000 Dm3.

4.4 Safety Plan

The *safety plan* consists of life saving appliances and fire control equipment. Life saving appliances are safety standards that must be met by a ship, to ensure the safety of the crew and passengers when a hazard occurs. Fire control equipment is a standard fire extinguishing system that must be present on a ship. The regulation of life saving appliances refers to the International Maritime Organization's LSA code.(1996), while *fire control equipment* refers to the International Maritime Organization's FSS code. (2000). The result of the safety plan design can be seen in figure 4.

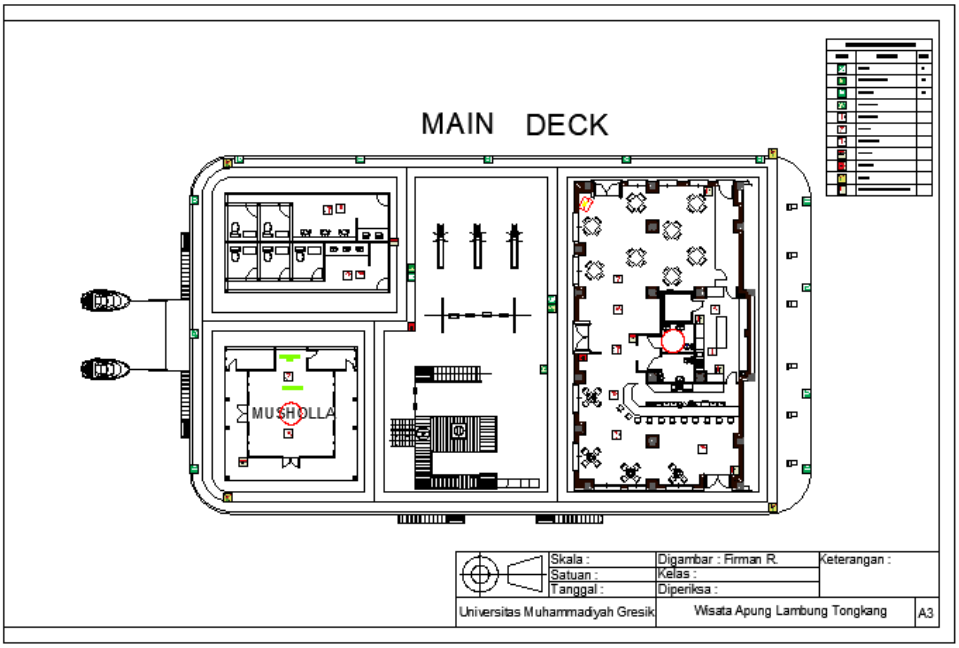

Figure 4. *Safety Plan*

5. Conclusion and Suggestion

5.1 Conclusion

The conclusion of this final project is as follows:

1. The size of the Barge that is in accordance with the condition of Ngipik Gresik Lake as a Floating Tourist Ship is:
   a. *Length Overal* : 28.7 m
   b. *Breadth* : 16.4 m
   c. *Draught* : 2.12 m
   d. *Depth* : 3.12 m
2. The results of the General Arrangement (general plan) of the ship are designed according to the needs of being able to carry 250 – 300 visitors and there is safety equipment in accordance with SOLAS
3. *More detailed General Arrangement* and *Safety plan* are attached. For *Safety Plan Design* based on the provisions of SOLAS 1974, there are additional items as follows:
   a. 255 *Lifejackets*, which are divided into 155 *lifejackets* and 100 *lifejackets for children.*
   b. 12 *lifebuoys* scattered across the main deck area.

5.2 Suggestion

1. A deeper review of the architecture and management of a floating tourism needs to be done considering the limited knowledge about management and architecture by the author.
2. It is necessary to carry out further construction analysis examinations to determine the strength of the ship's construction structure.

6. References

Marjali, M. (2023). *Ballast analysis on the barge during the topside platform loadout process using the software simulation method* (Doctoral dissertation, Hasanuddin University).

Prayogo, D. A., & Kurniawati, H. A. (2019). Design of Deck Cargo Barge as a Floating Concert Arena for the Gili Trawangan-Gili Meno-Gili Air Waters, Lombok. *J. Tek. ITS*, *7*(2).

Abidin, R. (2013). *ANDROID-BASED GO VISIT GRESIK INFORMATION SYSTEM* (Doctoral dissertation, University of Muhammadiyah Gresik).

Hidayat, M. T. (2023). *Ta: The Role of Pokdarwis in the Management of Tourist Destinations in the Rest Area of Labuhan Ratu Vi, East Lampung* (Doctoral dissertation, Lampung State Polytechnic).

Auliyaa, F. P., Pranata, M. H., & Firdha, N. D. (2025). *Utilization of the potential of the Ngipik Lake area with a biophilic architectural approach*. University of August 17, 1945 Surabaya.

Murtadho, A. A. (2021). *Historiography of Gresik local history*. Guepedia.

Sugianto, Y. (2020). *Summary of the steps of ship design according to spiral design*

Gresik Regency Tourism and Creative Economy, Culture, Youth and Sports Office. (2023). *Gresik Regency Online Tourism Visit Data Dashboard*.

Soekresno and Pendit, 1998.Food & Beverage Service Waitress. Jakarta: PT Gramedia Pustaka Utama.

National Standards Agency. (2004). *SNI 03-1733-2004: Urban Residential Environmental Planning Procedures*. Construction and Building Technical Committee.

International Maritime Organization. (1996). *International Life-Saving Appliance (LSA) Code* (MSC.48(66)). IMO Publishing.

International Maritime Organization. (2000). *International Code for Fire Safety Systems (FSS Code)* (MSC.98(73)). IMO Publishing.

Damanik, J. (2006). *Ecotourism planning*. PUSBAR UGM & Andi.

Pitana, I. G., & Gayatri, P. G. (2005). *The Sociology of Tourism*. Andi.

Yoeti, O. A. (1991). *Introduction to the Science of Tourism*. Sky.

Suwantoro, G. (1997). *The Basics of Tourism*. Andi.

Yoeti, O. A. (1997). *Tourism planning and development*. Pradnya Paramita.

Wijnolst, D. G. M. (1998). *Practical ship design*. Elsevier Science Ltd.

Parson, M. (2004). Parametric design. In *Ship design and construction* (Chap. 11). SNAME.

Rohmadhana, F., & Kurniawati, H. A. (2016). Technical and economic analysis of the conversion of landing craft tanks (LCT) into ro-ro type crossing motor ships (KMP) for the Ketapang (Banyuwangi Regency) – Gilimanuk (Jembrana Regency) route. *ITS Engineering Journal*, 5.