



# Fishing Boat Manufacturing Technology Is a Love Attraction for The Maritime Region

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## ABSTRACT

The territory of Indonesia mostly consists of seas with a large number of islands. One of them is islands and archipelagos in the Java Sea such as, Karimunjawa Islands, Bawean Island, and Kangean Islands. The Karimunjawa Islands located at the northern end of the Java Sea consist of 27 islands starting from Karimunjawa Island in the southernmost part and Mosquito and Parang Islands in the north. Bawean Island which is in the administrative area of Gresik Regency covers two districts, namely Sangkapura and Tambak. Sumenep Regency at the eastern end of the Java Sea region has 126 islands, ranging from Puteran Island in the west to Kangean Island in the east. Community transportation facilities for fishing activities, social activities, and various inter-island activities using wooden boats purchased or ordered according to function and available costs. This paper will examine the technology of making wooden ships that are widely used as a means of transportation for people on islands and islands in the Java Sea. The study of shipbuilding technology refers to the evolutionary concept of Leslie White's thought that a culture will develop more if it involves greater technology and energy use. The main problem in this study is how technology, energy, and culture related to wooden ships used by the community. The data collection method is carried out by observation, observation, and interviews with ship makers, buyers, and users. Because the types of Bugis and Madura ships are widely used by people on various islands in the Java Sea, this study took samples of Bugis and Madura wooden ships. Research that has been carried out has data that fewer and fewer young people are interested in shipbuilding. This study is expected to become more and more people who know and are increasingly interested in the maritime community.

**Keywords:** *Shipbuilding, Java Sea, fishing, linggi, sento*

## 1. INTRODUCTION

The territory of Indonesia mostly consists of the sea with an extraordinary number of islands, the sea activities of our ancestors by ship have been inscribed in the reliefs of Borobudur Temple [1]. Many Indonesians live on the islands. Community transportation facilities for fishing, social, and inter-island activities using wooden boats purchased or ordered according to function and available costs. This paper examines the technology of making wooden ships that are widely used as a means of transportation for people on the islands. The Java sea area is one of the sea lanes crowded with ships, be they small or large ships. The crowded voyages of the Java Sea in the past have also been revealed in Tjiptoatmodjo's dissertation, which mentions the existence of voyages in 1599 from Jakarta, Karimunjawa, to Tuban, the westerly wind that blows between November to March was used by native and foreign sailors to visit the eastern regions of the archipelago [2]. The past bustle of shipping activities in the Java Sea can also be known from the many sunken shipwrecks in the Java Sea. The following is a table of shipwrecks in the Java Sea.

**Table 1.** Shipwrecks in the Java Sea

Location	Happen	Total	Load(ton)	Location Description
5° LS, 115° BT	1601-1875	45	18.020	Along the waters of Banten; Banten (west of Batavia); Jakarta waters (Batavia); The waters of Batavia are adjacent to the port of Batavia; Duizend Island (Kep Seribu north of Batavia); Boomjes Island (northeast of

				Batavia); Alkmaar Island near Batavia; Batavia Sea Base; About 14 kilometers from Pamanukan (east of Batavia); Peressada Reef; Indramayu Coral; Coral Brouwers; Along the waters of Semarang-East Java; North of Surabaya Port Jeparu (Semarang Bay); Semarang Base (east of Batavia)
	7°41'LS,109° 5' BT			Cilacap Waters
Sunda Strait	1629 -1855	9	4.212	Around the waters of the Sunda Sea; south of the waters of the Sunda Strait; northwest of Puteri Island

Source: [3, p. 87]

The decade of the last 70s of the marine world was also shaken by the sinking of the Tampomas II Ship which claimed many victims, the incident occurred on the high side of the Masalembu sea waters [4]. At present, if we are around Tanjung Priok Port Jakarta, Semarang, Tanjung Perak Surabaya, or in the waters around Pula Parang, Mosquito Island (northernmost part of Karimunjawa Islands), Legon Bajak (southeast side of Karimunjawa Islands), West side pier Karimunjawa square, Wae Tuo north side of Kramian Island, west side pier of Masalembu Island, around Dungkik Pier in Madura. The pier in the Nunggunong and Ketupat areas on Sepudi Island will feel crowded with marine activities, starting from resting, preparing materials for fishing needs ranging from food, drinks, diesel, ice, salt, some are repairing the completeness of *their fishing*. Then if it is night, there will be lights that decorate the entire body of the ship with the accompaniment of loud music that comes out from inside the ship. Although it is now somewhat reduced, but often seen ships with names written on the hull, flags on board, or writings on container crates can be suspected by ships from various regions. It is true as stated by Wirjono Prodjodikoro, that everyone who has sailed on a ship through the great ocean will feel a certain community among everyone on the ship [5, p. 26]

## 2. OBJECTIVES

The hustle and bustle of life in the sea is our attraction to study the life of marine communities because there is so much that can be revealed, the study is limited to the Bugis and Madurese communities that are always found in various marine areas in Indonesia. The study focused more on ships as the main means of transportation in the Java Sea. Because the types of Bugis and Madura ships are widely used by people on various islands in the Java Sea, this study took samples of Bugis and Madura wooden ships. The problems answered in this study are how technology, *energy*, and culture *related to* wooden ships are used by the community; and how shipbuilding technology can be an attraction to the love of maritime areas.

## 3. METHODS

The data collection method is carried out by observation, observation, and interviews with ship makers, buyers, and users. The study of shipbuilding technology borrows the evolutionary concept of Leslie White's thought that culture will develop more if it involves greater technology and energy use.

## 4. FINDINGS & DISCUSSION

### 4.1 Bugis Dan Madura Community

The Karimunjawa Islands located at the northern end of the Java Sea consist of 27 islands starting from Karimunjawa Island in the southernmost part and Mosquito and Parang Islands in the north. The Bugis community is found in Batulawang, the central region of Karimunjawa located on Kemujan Island. The Madurese community is found around Nyamplungan, an area on the north side of Karimunjawa Island. Please note that in this region there is the tomb of Sunan Nyamplungan who is the son of Sunan Kudus which means the Karimunjawa region which is closely related to his religious religion. The Bajo community in the 80s when we went to Karimunjawa inhabited a lot in the Beteng area on the southeast side of Karimunjawa square, now (2023) more scattered in several areas in Karimunjawa. Many of them sell ready-to-eat foods, such as tape and food made from cassava. In the Karimunjawa community, tape and tape

and cassava foods from Parang Island are famous for being sweet and delicious, such as cassava food from Bawean Island on the east side of the Java Sea waters. Karimunjawa handicraft business and online sales of bonsai are also mostly carried out by ethnic Bajo. The high spirit of adaptation of the Bajo ethnicity is well known in the community, it can also be found in the Bajo writings by Nasruddin Suyuti which refer to the opinions of Hawley and J.W. Bannet in adapting to the environment and meeting needs[6, pp. 17–18]

Karimunjawa fishermen have a system of working together in one boat teamwork. They worked together on a ship made of wood with crews varying in number from five to seven. The fishermen came from Java, Madura, and Bugis. The target area for fishing to go to the *middle* or go to sea is adjusted according to the calculation, usually to Bitung waters, Kramian and Masalembu Island waters, Papua waters, or Kalimantan waters around Kota Baru. Every day around 16.00 WIB the ships will go to the *middle* to set the net and wait overnight until the morning around 5.00 WIB the net is taken, the fish from *the sea* are stored in the ship then docked to the island to rest, repaired the net, and prepare equipment to set the net in the afternoon. From the Karimunjawa community, wooden shipbuilding technology will be taken by the Bugis ethnicity in Batulawang. Please note that the Bugis ethnicity ([7]) is an ethnic seafarer, this can be known from the existence of the sea trade law A Manna Gappa [8] that it has. In addition, many Bugis people do migrate, even to live settled in neighboring countries.

Sumenep Regency area at the eastern end of the Java Sea region has 126 islands, ranging from Puteran Island in the west to Kangean Island in the east. Kramian Island is at the northernmost tip of the Sumenep region (a two-day and one-night sea trip to reach the district capital), consisting of three hamlets, namely Sudi Mampir Hamlet, Wae Tuo (living water), and Tanjung Peleh. Kramian Island is administratively included in the Masalembu District, Sumenep Regency. While Manuk and Sepudi Islands are water areas in the middle of Sumenep Regency (sea travel is three to four hours by sea to the district capital). The image of wooden ships as a characteristic of Madurese society will be taken by *ice-picking* ship activities as fish collectors in the mid-sea fish market in the waters between Kramian Island and Masalembu. In addition, it also displays resident ships around the waters of Manuk Island and Sepudi Island which have more speed than the surrounding ships.

#### 4.2 Bugis Dan Peng-Es Madura Boats

The use of boats in fishing communities in the waters of the Java Sea is adjusted to their needs. For diving purposes fishing on the outskirts of the island, transporting goods and passengers from land to larger ships, the means of planting and harvesting seaweed fishermen use many *jukung* boats. This boat without using an engine, is driven by pedals. Some models wear one or two safety legs on the left and right of the boat. Here is a photo of a *jukung* boat.



**Picture 1.** The Jukung Boat  
Source: Research Data, 2023

Bugis fishermen who live in the Karimunjawa Islands to go to find anchovies use a lot of *branjang boats*, with the characteristic that there is a *lunjong* or pole used to roll anchovies and *moleng* draped nets. Bedboats usually operate between three or four people. The captain or boat owner and crew to lower and raise the nets. The types of anchovies caught, range from white doro anchovies that appear early in the anchovy season to brownish anchovies, and black anchovies when the anchovy season ends. The anchovy season is over, the owners and crew of the bunk boat will fish for cobs, and after the cob season is over, the owners and crew of the bunk boat will rest. They will rest the boat and its fittings, repairing if there is damage or deficiency.



**Picture 2.** The Branjang Boat

Source: Research Data, 2023

The parts of the bunk boat include the keel, which is the bottom of the boat. The length of this keel will determine the length of the boat. The wood that is often used for the keel position is usually ulin or laban. The choice of wood material is because the keel is the most important part of the boat frame. In addition, wood that is positioned as a keel is good wood and does not connect.

The other part is the front and rear circles connected to the keel. The front circumference must be higher than the rear circumference, because, in addition to protecting the wave water from the front from entering the ship, the front circumference is also used as a standing place for the captain's assistant if the ship enters an area with many reefs or obstacles in the sea. The other parts of the boat are iga-ribs and sento. Another type of ship is the Jonson ship which is widely used by Bugis fishermen in the Java Sea region. The size of this type of ship can be known from the number of boards used, for example, five boards to 10 boards. Here is a photo of the Jonson ship with 10 boards. This Jonson ship belongs to Pak Makmur (Bugis people) and was made by his elder brother Hsn. In the Karimunjawa Islands region, Pak Hasan is the only Bugis there who is still diligent in making residents or tourists order ships. Here is a photo of the Jonson Boat and its manufacture.





**Picture 3.** The Finished Jonshon Boat

Source: Research Data, 2023

This type of ship requires more material with good wood quality because usually this ship is used to go to sea to various waters in Indonesia. Java Sea waters around the Karimunjawa Islands, Bitung waters to Sumedang island, Jepara waters, to the easternmost Madura waters. During fishing activities in the middle, if the ship can fit a lot of ice, it will be longer in the middle of the sea to find fish, if it is felt with various considerations that they have to go home, they will return to their original area to sell fish. But some sell fish to fish reservoirs in the middle of the sea. This fish reservoir buys fish from fishermen from various directions, because their ships are larger and more magnificent with fish boxes on all hulls and full of ice, so they are often called *ice-packing* ships or Brondong ships because they come from Brondong Lamongan. This ship is different from the Bugis Jonson ship to find fish. The shape is more rounded in general as a characteristic of other Madurese ships. Usually, entrepreneurs and makers come from Madura.



**Picture 4.** Ice carrier. In the waters between Bawean and Masalembu

Source: Research Data, 2023

### 4.3 *Bawean Island in Maritime Archipelago*

Bawean Island is an island located between Java Island and Kalimantan Island, occupying a geographical and strategic position. Bawean Island previously also served as a transit point, a means of sea transportation. Given its position as one of the links in the trade chain and political routes, it is not surprising that Bawean Island has always been a place of contention. Bawean Island located in the middle of the Java Sea once occupied an important place in the archipelago's road network. Its central location on inter-island shipping lanes makes Bawean a stopover for food and water, as well as a shelter from storms. This interaction with the outside world also has an impact on changes in other regions of the archipelago [9, p. xi].

Bawean Island seems to have played an important role in trade and shipping in the past. The Chinese short story, *Toa-l-Chih-Lueh* calls Bawean Island as Pu-Ban or Pu-Ben which means somewhere in the north south of the Java Sea. Groeneveldt argues that the site is Bawean. This is based on the mention of Asians who call the Boyan tribe opposed to the Bawean tribe. Chinese news reported Bawean to be a stopover for Chinese traders traveling to Java Island or vice versa [10, p. 510]

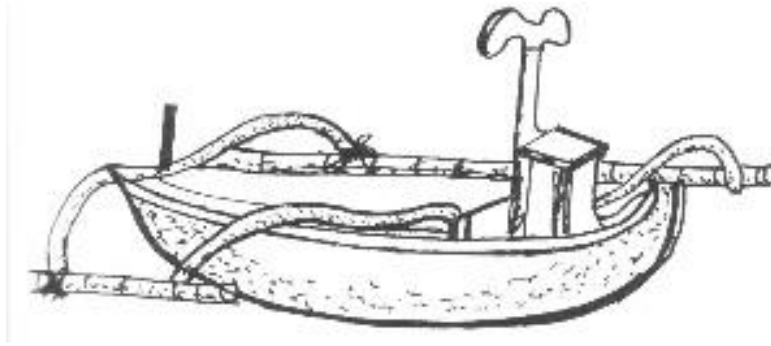
Regarding archaeological data in the form of many intact ceramic finds and fragments on Bawean Island, according to Widyaheri's research in 1986 information was obtained that the astronomical position of Bawean Island is very strategic, in the middle of traditional trade routes. In addition, Bawean Island is used to replenish shipping supplies, including clean water. Judging from the number of pottery found, it seems that the east coast of Bawean is favored as a mooring place for merchant ships compared to the south coast [10, p. 512] This was also reinforced by the discovery of shipwrecks in the open air on Gili Island. Based on a colonial map in 1911, the northeast (Gili Island) and west (Nusa Island) are depicted as shipwrecks. The existence of this shipwreck is one of the important maritime archaeological data in Bawean. Based on the *Dictionary of Disaster at the Sea during the Age of the Steam*, there were four shipwrecks recorded on Bawean Island, namely SS Bengal, Janbi Maru, Langkoeas, and Leeds City [11].

The existence of a steam engine wreck found on Bawean Island is thought to be related to the maritime network of KPM (*Koninklijke Paketvaart Maatschappij*). Previously, Bawean Island was one of the hubs in KPM's maritime network, began operating sea transportation services in the Indonesian archipelago and included Bawean Island in its sea transportation network, including the road route between Surabaya-Bawean-Banjarmasin-Bawean - Singapore^ Bawean- Singapore. The inclusion of Bawean Island in this shipping lane is only for passenger transport because migration marks have brought economic benefits to KPM, the import and export of goods to or from the island is a very important maritime network in the colonial archipelago [12, p. 91]

### 4.4 *Traditional Bawean Boat*

A group of people including Madurese, Boyan, Javanese, and Bugis tribes live and settle in Bawean, usually living as fishermen and building boats. In addition to building/building boats, they also repair damaged boats. Initially, the boat builders in Madura had a philosophical background in making boat parts and selecting wood materials. A wall painted in one color also has a certain meaning. The wood used to make a boat is not just any wood. The wood from the tree struck by lightning cannot be used to build a boat. The support or arc frame should not be made of solid wood but must be of V-shaped solid wood.

On Bawean Island, there are two types of boats used by fishermen to catch fish: *Kalotok* and *Jhukong*. *Kalotok* is a traditional boat made of wooden boards tied/connected with wooden poles/bamboo tied to ivory or supports. The size of the *klotok* usually measures 8.75 meters long and 2 meters wide. The characteristic of *klotok* in Bawean is the statue of a seka bird placed on the back of the *klotok*. In addition to *klotok*, another typical traditional boat is *jhukong* / *jukung*. *Jhukong* is made from binong tree. The characteristic of *jhukong* is that the bottom tends to be thicker than the top. Furthermore, the characteristic of *jhukong* is the presence of a cater/katir or stabilizer on the right and left sides of the *jhukong* body. There is also a type of boat called a *sampan*. This type of boat is made using canoe techniques. A large log about 1.5 to 2 meters in diameter, the outside of which is formed by a boat/canoe. Then the inside is scraped until a tub-like hole is obtained. After scraping and obtaining a wall thickness of about 3 cm, the outside will be smoothed, and boat-shaped. Currently, dredging techniques are almost non-existent because of the difficulty of obtaining wood material from large trees that are still intact. [13, pp. 50–51]



**Picture 5. *Jukung Tengongan***, its name comes from Sepudi for jukung in Tarebung and Bawean. The shape is slender with outriggers on both sides. The display stand is located close to the driver's seat. The overall length is about 4-5 Meters. This jukung is commonly used to catch fish and shrimp in shallow waters.

Source: [14]

#### **4.5 Technology, Social Media, And Tourism**

Research has found that fewer and fewer young generations of shipbuilders are interested in shipbuilding. Hsn, who is considered the most expert in building ships, is now 70 years old. He was born with seven brothers, all and all fishermen. His expertise in making ships was obtained from his grandfather who also built ships when he was in Sulawesi. In the 70s, his extended family left Karimunjawa and settled in Batulawang. The Bugis people in the Karimunjawa Islands mostly use their homemade ships, considering that only Hsn can make ships. Hsn had two children, a boy named Mehls and a girl. None of his two children were interested in fishing, so the knowledge of making his boat was not inherited. As well as the nephews of his brother, no one was interested in being able to build a ship. During this time Hsn was assisted by three to four carpenters to build ships. Their relationship is a working relationship only and all decisions or steps to use the type of wood or the position of the linggi, keel, sento, and other parts are determined by his instructions.



**Picture 6. Bugis Shipbuildings**

Source: Research Data, 2023

The inheritance of shipbuilding knowledge is worrying, considering that ships are a means of transportation that is a basic need for inter-island people's lives. In addition, the ship is also the main tool for fishermen to catch fish. Although there is an inheritance of knowledge to the carpenters who helped complete the shipbuilding, the inheritance will be different if the family or relatives are involved in building the ship. One of Hasan's brothers who was interested in ships

was Drsk but specialized in ship engines. Culture has a dynamic nature, undergoes change or development, and will remain alive if there are still supporters. Therefore, shipbuilding knowledge needs to be considered so that the culture is decreasing, considering that ships are a basic need in the life of the marine community.

## 5. CONCLUSION

One idea that can be used as an alternative encourages the younger generation around the community, among others, by increasingly applying technology to make ships easier, such as electric-powered tools that facilitate the manufacture of ship parts. The move was made so that the younger generation of shipbuilders, either from their families or families were interested in passing on that knowledge. Technology in the field of social media also needs to be involved by always saving and *sharing* or creating status. At least with the preference of the younger generation in the maritime cultural environment to be closer to the shipbuilding system. Especially now that the social media stage has become its value to make an individual emotionally and psychologically involved. Another step to further increase the love of the younger generation of marine communities for shipbuilding techniques is by exploring maritime culture related to sunken ships and their history, The step was carried out with consideration of increasing tourism under the sea which is expected to be a driver for the younger generation wherever agaftr is interested in marine. In the end, this study is expected to become more and more people who know and are increasingly interested in the maritime community.

There are data on sunken ships and historical records that support marine traffic. If various data related to Karimunjawa and Masalembu and archaeological remains can be identified and then analyzed, it will get a picture of *the maritime culture* around Karimunjawa and Masalembu. Such archaeological maritime history can encourage younger generations to be more interested in the marine field including ships and their manufacture. The challenge of how the ship forms, the strength of the materials, and its reach will add another attraction for people to pursue the field. Public interest in the natural environment as a whole and people's perception of their natural environment related to archaeological objects that discuss human cognition at sea and on the coast as perceptions related to maritime culture [15]. Then, tracing past lives that occurred in an area can be traced as Lusar expressed the analysis that searches for human life in the past using *Thunder Bay* on Lake Huron and the Michigan, Peninsula [16].

## 6. COMPETING INTEREST STATEMENT

This article is free from any conflict of interest regarding the data collection, analysis, and the publication process itself. Either replicate or modify the previous sentence for this part.

## 7. AUTHORS' CONTRIBUTIONS

All authors equally contribute to designing the research, building up the conceptual framework, analyzing the data, and interpreting the research findings.

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