



## The Cruise/Vessel Characteristics Of Inland Waterways

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**Abstract.** *Inland water shipping has not been used maximally, its utilization is still very minimal. Though the opportunities for good use for the purpose of transportation of goods, passengers, tourism are still very broad, very cheap for the transportation of goods in large quantities such as those which began to be developed on the islands of Kalimantan and Sumatra for transportation of mining products and agricultural products<sup>2</sup>. Sailing through rivers and lakes is one form of transportation system that is used to transport goods and passengers through inland waters. This transportation system is a transportation that has developed since prehistory which then developed into the main transportation system in certain regions even in more developed areas such as the European transportation system. In river shipping various kinds of goods are transported from the hinterland to the port. Conversely, through the river also goods from the port are distributed to areas in the interior. The same thing happens in lakes, various kinds of goods are transported to and from cities on the other side of the lake. Sailing of rivers and lakes has an important role<sup>3</sup> in transporting trade goods. Agricultural products, livestock / fisheries and forest products are one of the main commodities transported via river shipping. In addition, mining and handicraft products of the population.*

*Keywords: Shipping; Rivers and Lakes; Characteristics.*

### 1. Introduction

The history of river transportation in Indonesia began in quite a long time. Since prehistoric times humans have been carrying out transportation activities in meeting their daily needs. In the beginning the boat used was a bamboo raft or large wooden sticks formed by making a hole in the middle. Slowly, human thinking progressed, various types of boats began to be created. Ranging from bamboo rafts (*getek*), mortar boats, canoes, to boats that use engine power. In modern times the government promotes transportation through rivers, especially in the interior areas of Kalimantan, Sumatra and Papua. The river is used as a means to deliver timber from the forest to the shelter.

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<sup>2</sup> Britain's Inland waterways, An Undervalued Asset, Inland Waterways Amenity Advisory Council, London 1996

<sup>3</sup> British Waterways, Waterways & Development plan, London, 2003



Activities at the Kahayan river pier in Central Kalimantan<sup>4</sup>

Paskah Suzetta said that currently the river transportation is mostly carried out by the community, especially in areas where road infrastructure is not yet available. River transportation has the advantage of being relatively cheap, but its use has diminished especially in areas where road and bridge infrastructure has been built<sup>5</sup>.



A water bus that operates on the Barito river

Many rivers can be utilized as the main transportation network in Kalimantan, which includes the Kapuas River, Kahayan River, Barito River, and Mahakam River. In Sumatra include the Musi River, the Indragiri River and the Kampar River. Meanwhile, in Papua there is a strategic river potential, but its use has not been optimized for transportation services, namely the Memberamo River in the southern part of Papua. The three islands

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<sup>4</sup> *Ibid.*

<sup>5</sup> Department for Environment, Food & Rural Affairs, *Freight on Water A New Perspective*, London, 2002



also have abundant natural resource potential, both from plantation and mining products. Large coal reserves are found on the island of Sumatra, reaching 27.4 billion tons, and on Kalimantan Island reaching 30.1 billion tons. In addition, the three islands also have quite large plantations, such as oil palm and other commodities.

## 2. Discussion

### 2.1 Understanding of Inland Waterways

Some definitions relating to land, river and lake transportation in the legislation are as follows:

1. River and lake transportation is a transportation activity using ships carried out in rivers, lakes, reservoirs, swamps, banks, canals and canals to transport passengers, goods and / or animals, which are carried out by river and lake transportation companies (PP 82, 1999 article 1)<sup>6</sup>
2. Included in Indonesian waters are inland waters including rivers, lakes, reservoirs, canals and canals. (Act No. 17, 2008, Elucidation of Article 4.)<sup>7</sup>
3. One type of transportation in waters is river and lake transportation (Act No. 17,2008, Article 6 letter b.);
4. What is meant by "river and lake waters" includes rivers, lakes, reservoirs, canals, canals, and swamps. (Act No. 17, 2008, explanation of Article 163 Paragraph (3))
5. The flow and crossings as regulated in article 187 of Act No. 17, 2008

3) In the river and lake navigation lanes, flow classification criteria are determined.

4) Establishment of river and lake shipping lane classification criteria is carried out with regard to advice and technical considerations from the relevant Minister.

6 Provisions concerning River and Lake Transportation in Act No. 17, 2008 articles 18 and 19 contain:

#### Article 18

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<sup>6</sup> Government Regulation No. 82 of 1999, concerning Water Transportation

<sup>7</sup> Act No. 17 of 2008 concerning Shipping



1. River and lake transportation activities in the country are carried out by Indonesian citizens or business entities using Indonesian flag vessels that meet the requirements
2. seaworthiness and manned by Indonesian Crew.
3. River and lake transportation activities between the Republic of Indonesia and neighboring countries are carried out based on an agreement between the Government of the Republic of Indonesia and the government of the neighboring country concerned.
4. River and lake transportation carried out between the two countries as referred to in paragraph (2) can only be carried out by Indonesian-flagged vessels and / or the country's flagged vessels concerned.
5. River and lake transportation activities are arranged and carried out in an integrated manner by paying attention to the intermodal intradiction which is a unity of the national transportation system.
6. River and lake transportation activities can be carried out using fixed and regular routes or irregular and irregular routes.
7. River and lake transportation activities are prohibited at sea unless obtaining permission from Port Authority while still meeting the vessel's seaworthiness requirements.

#### Article 19

1. To support the main business, river and lake transportation activities can be done for their own interests.
2. River and lake transportation activities as referred to in paragraph (1) may be carried out by Indonesian citizens or business entities with Government permission.

### 2.2 River Transportation Classification

River transportation<sup>8</sup> and lakes can be grouped in several categories as follows:

1. River mouths and river sections affected by tides such as Palembang, Banjarmasin and several other areas are affected by river tides. Can be used by sea shipping as

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<sup>8</sup> Op.Cit.



long as the channel depth is sufficient. Suitable for the transportation of bulk goods, containers.

2. Large rivers that are not affected by tides can be sailed by ships as long as they are equipped with doors / locks that are suitable for the size of the ship.
3. Wide waters or lakes that are not affected by tides, transportation by river-specific vessels, barges through the door / lock, can still be used for container transportation.
4. Narrow canal is an artificial shipping channel used for small size transportation, not suitable for containers

The principle is that all waters can be navigated as long as the depth of the channel is controlled, for that in various developed countries a door / lock is used that can control the depth of the river and lake shipping channel so that the area that can be connected with inland shipping becomes wider. Based on experience in various countries in Europe<sup>9</sup>, where the use of inland shipping lanes in Indonesia needs to be developed, to improve the use of inland transportation, various steps need to be taken:

- Improving the status of inland transportation at the local level, in this case the regency / city, at the regional level, in this case the province and at the national level, especially for transportation through several provinces or river transportation entering sea waters.
- Thereby investing in inland transport infrastructure so that in turn it will provide long-term benefits by improving the regional economy that is connected to navigable inland water facilities.

Inland shipping can be utilized for various purposes, but the most important thing is to transport goods as is often done in the Musi River in South Sumatra, Barito River, Kahayan River, Kapuas River. Membrano River, including passenger transportation, social and cultural activities as well as water sports activities that are commonly found in cities flowing by large rivers or even white water rafting upstream which are also widely developed and utilized in various European Countries are for water tourism purposes cruise through the river which is in great demand by tourists.

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<sup>9</sup> Robert A. Pietrowsky, *Inland waterways: A Key Part of the US Freight Transportation System*, 2009



Table 1. Benefits of inland shipping routes<sup>10</sup>

Purpose of Utilization	Benefits of shipping lines
As a generator of activities	<ul style="list-style-type: none"> <li>• As a catalyst for development, economic and social relations</li> <li>• Increasing the value of development and investment opportunities will increase</li> <li>• Contribute to improving community relations, improving the quality of people's lives.</li> <li>• Generating long-term economic activity and employment opportunities</li> <li>• Diversification of development in rural areas</li> </ul>
Sports	<ul style="list-style-type: none"> <li>• Is an important place for water sports activities</li> <li>• Improve the health of the people who exercise</li> <li>• Sports track between urban and rural</li> <li>• River banks can be used as jogging and / or cycling paths.</li> </ul>
Tourism	<ul style="list-style-type: none"> <li>• Interesting tourism assets</li> <li>• Creating relationships between existing tourist areas and new tourist areas.</li> <li>• Support the tourism industry</li> </ul>
Culture and the natural environment	<ul style="list-style-type: none"> <li>• Is a cultural asset that has been developed by the local community, such as the Lake Toba Party</li> <li>• Contributing to open space</li> <li>• As part of the habitat of fish, animals or certain plants.</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Is part of an integrated transportation system</li> <li>• Create a choice of transport routes at the local, regional and</li> </ul>

<sup>10</sup> Department for Transport, Transport Energy Best Practice: Planning for Freight on Inland Waterways, Office of the Deputy of Prime Minister, London.



	<p>international level.</p> <ul style="list-style-type: none"><li>• It is an important water transportation infrastructure for the movement of goods and people</li></ul>
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From the list above, it is clear that there is much that can be done for the use of inland water transport which in Indonesia has not yet been developed and there are even activities that have not been touched at all. Increased utilization of the inland waterways will encourage the economy, social and cultural activities of the area that can be connected with the inland shipping network.

### 2.3 Characteristics of Land Water Transport

Sailing on land water is one of the oldest economical and environmentally sound transportation of people and / or goods and inland areas may be the only mode of transportation for access to markets and other social activities. Modes of transportation can range from bamboo rafts to motorized vessels that can operate in small rivers, lakes to large rivers.

#### a. The main characteristics of the Inland Waters

Inland waters have four main characteristics:

1. Inland waters are corridors that cover several regencies / cities and even provinces, so the steps taken by one region to another must be well coordinated.
2. Terminals / docks are needed to raise and lower passengers or goods to the next by the mode of the road channeled with the final destination.
3. The route is usually single, except when one river is connected to river like the one in Central Kalimantan and South Kalimantan.
4. Navigation controls need to be controlled if these inland cruise lines are used for various purposes, transportation of goods, passengers and tourism.

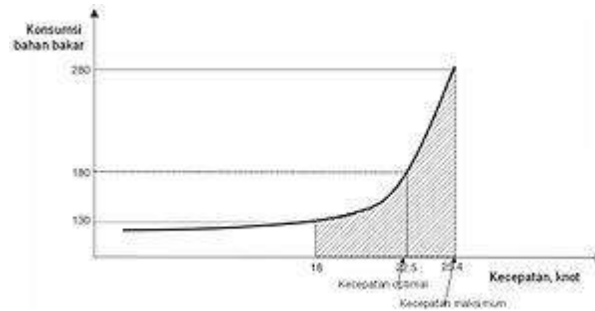
To get a good inland transportation system, maintenance, control and regulation need to be carried out and if necessary by setting fares for the use of the shipping lane as carried out in Ambang Barito.



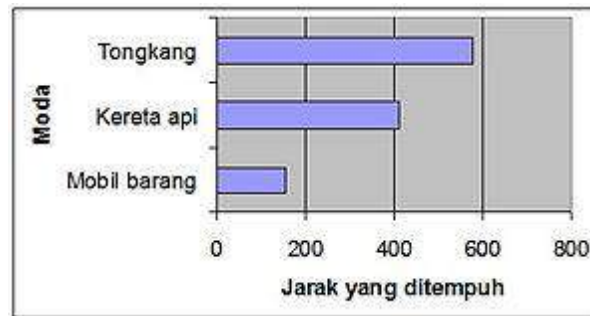
## **b. Excellence**

Technically, the characteristics of inland water transportation give advantages to these modes to compete with other modes. The advantages of using transportation in the mainland waters include:

1. In areas that have rivers that can be used for transportation, it is not necessary to build new infrastructure other than loading and unloading docks because they are naturally available. In India, with the same length of transportation lines, the cost to develop inland water transportation is only about 5% to 10% of the cost of developing a 4-lane toll road or building a railroad network.
2. River infrastructure only needs to be maintained at a low cost so that infrastructure capacity will generally be sufficient. In India, with the same length of transportation line, the cost of maintaining mainland water transport is only around 20% of the cost of maintaining the road;
3. Serving as the main transportation for remote areas where road construction is not yet expensive or expensive to build;
4. Have a higher level of safety than road transport in the aspect of its low speed, especially when equipped with adequate safety equipment;
5. Very suitable for tourist transportation, such as those that have begun to be developed in the major rivers of Kalimantan and in the Musi river;
6. Able to transport directly from deep sea water transportation to inland water and vice versa.
7. Able to transport with large volumes, along the depth and width of the groove in accordance with the ship used;
8. The use of fuel is more efficient, although the higher the speed of the ship the use of fuel will increase exponentially, so that water transportation is more suitable for goods with low value and large volumes;



The relationship between fuel consumption and ship speed



Mileage to transport one ton of cargo with the same fuel consumption<sup>11</sup>

Table 3.1. Comparison of Energy Consumption per Unit of Charge

Mode	Average	Minimum	Maximum
Inland waters	1,0	1,0	1,0
Freight trains	1.42	1,0	1.71
Road (trucks 25 - 38 tons)	3.08	2.47	3.57

9. Has a lower environmental impact when compared to roads and rails;

<sup>11</sup> Endang Susilowati, The Role of the River Network as a Trade Channel in South Kalimantan in the Second Half of the XIX Century



Table 3.2. Comparison of Environmental Impact Per ton-kilometer<sup>12</sup>

Environmental burden	Street	Train	Inland cruise
Greenhouse Gases (g CO <sub>2</sub> Eq)	59.0	28.0	22.0
NO <sub>x</sub> , SO <sub>2</sub> (ppm) toxic gas	16.7	7.2	9.8
Smog (g NO <sub>x</sub> and HC)	.84	0.35	0.47

10. It is more economical to transport bulk goods at relatively long distances;

Table 3.3 Comparison of Transportation Costs per Load Unit<sup>13</sup>

Mode	US c / ton mile	Relative to water modes
The waters	0.75	1
Pipe	1.45	2
Train	2,3	3
Street	26.2	35
Air	61.2	82

### c. Weaknesses

On the other hand, the characteristics of inland water transport also have weaknesses including:

- Has natural barriers (depending on the depth and width of the groove);
- Fluctuations in water during the dry season;
- In the rainy season floods sometimes occur;
- Prone to siltation and river bank erosion;
- Relatively lower speed;
- The level of reliability is not maintained;
- Less flexible because of the small catchment area along the flow of the channel;

<sup>12</sup> *Ibid.*

<sup>13</sup> Opening of the National Integrated River Transportation Development Seminar (2008)



- Accessibility is low because sometimes it is difficult to reach from the road;
- There is a tendency for transportation to over capacity;
- High investment for new vessels;
- Low level of comfort for passenger transportation;
- Culture that is conservative and traditional in the operation of providing inland water transport services;
- Small role (share capital) in the transportation system; and
- Operating time is limited because at night it is difficult to sail with limited navigation aids.

Inland water transportation can develop if there are other supporting factors, such as:

- Traffic jam on the highway;
- Warehousing facilities provided on the water (floating warehouse);
- Efficient inland water transport efficiency; and
- Increased costs on road transportation.

#### d. Travel Distance



The economics of the modes of road, rail and sea transportation

Each mode has advantages based on distance, for short distances it would be preferable to use road modes, medium-distance trains while long distances use water mode as shown in the following figure.



There are still other factors that need to be considered, namely the availability of infrastructure, if infrastructure is not available such as trains, there are only islands in Java and parts of Sumatra. In river flow areas that are not supported by the road network, the mode of transportation has no other choice than the mode of water.

### 3. Conclusions

The government always promotes transportation through rivers, especially in the interior areas of Kalimantan, Sumatra and Papua over the times. The river is used as a means to deliver timber from the forest to the shelter. However, there are several infrastructures that must be prepared carefully to serve the needs of the community, the media distribution of goods and support the improvement of the economy of the community in the interior.

### Reference

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