THE CHARACTERISTICS OF RURAL WATER TRANSPORT: CASE STUDIES OF THREE PROVINCES IN INDONESIA

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Abstract:
The role of water-borne transportation in various areas of Indonesia is felt to be very important, especially in those more remote places, which are unreachable, by land transportation. The potential of rivers, especially in serving access for people in remote area is enormous. Compared with currently 300,000 km or roads, Indonesia has utilized only 21,579 km navigable rivers. Although it is a very important mode of transport, yet such is the case that this form of transport is no longer flexible in anticipating the settlement development patterns of rural areas which oftentimes are not oriented around water. This can be seen in the proportion of government funding in study areas for water transport is very small compared with land transport. Another problem faced by rural water transport is safety caused by inadequate infrastructure and standard. Regulation and institutional concerns were important issues in three study areas.

key words : rural, water transport, Indonesia, competition

1. INTRODUCTION

The role of water transportation in various areas in Indonesia are very important, especially in remote places which are unreachable by land transportation. The condition of the development of water transportation at this moment seems to be stagnant as a result of the expansion of land transport and the decrease of demand. The sea area of Indonesia is about 7.9 million square km which position Indonesia as a nation with people navigation as its basic power to develop its economic sector. Unfortunately, Today the operational of Indonesia's navigation causing the

lack of foreign exchange because most of export-import transports are conducted by foreign ships, that they should pay the shipment with foreign currency. This shortage becomes a constraint to the development of Indonesian shipping.

The development of the land and water transportation does not always constitute a rivalry. This is caused because some of the areas that cannot be reached by land transport are very remote or are made up of small archipelagos. In general many rivers dry up in the dry season and thus cannot be sailed while many of the surface roads are in bad condition as a result of being overused. But in study areas, in wet or dry season the water transport activities are not change significantly. The reason is the study areas are located on the up stream of the river therefore in dry season the rivers are still navigable. The industrial and farming sectors rely heavily on water transport to get their goods to hinterland areas. Another problem to be addressed is the lowering of the number of passengers and even goods from year to year. Below is the comparison between land and water transport infrastructures in study location.

This project's goal is to compare characteristics of water transport operations in rural areas in different environmental and socio-economic conditions and use the results to identify success factors in connection with inexpensive rural water transport.
There are 5 objectives of the field work. They are:

a. Recent state and development of water-based transportation in accommodating public demand within the study area.
b. Identifying problems in recent development of water transport based on the user perceptions.
c. Level of service provided by the operators.
d. Recent changes related to the present situation of in-land water transport
e. Trends occurred in the study area, and what the people hopes

The objective is to obtain a study combining the researchers' point of view with understanding from people in society and how they see these issues. At this stage it is more important to get quality ideas than a large quantity of data.

2. REVIEW OF PREVIOUS STUDIES

Research reviewed various national and international sources concerning water transport in rural areas. These documents are provided in the bibliography. There are about 57 references and 33 websites listed. Divided geographically, they are:
a) South Asia
b) Southeast Asia
c) Africa
d) South America

Nationally, the largest total of reports (21) are from Bangladesh. These include the 2 most comprehensive studies ever done on rural water transport – a 2-year study on socio-economics from the mid-80's and a socio-technical project carried out between 1988 and 1992. (Jansen, E. G., Dolman, A. Jerve, A.M., and Rahman, N, 1985)

Reports from India and China almost exclusively focus on large scale projects, with government support for water transport between islands. China has a good network and has

already started to improve and renovate it. While in India the transport network is not as good as in China, some new policies are starting to support this oft-forgotten issue.

UNESCAP is also concerned about supporting water transport in remote areas, yet its focus is still on large scale, formal sector operations. A report on nationally-owned ships was made in 1992 but was never published. Positive indications were received from several ESCAP member nations, with special appreciation for Viet Nam which has all different forms of water transport. Cambodia is very supportive of the informal sector and the report from Viet Nam mentioned above is a very complete for having originated outside Bangladesh.

In Africa, studies from Sierra Leone, Cameroon, and the Niger Delta do not provide statistical information and illustrations regarding rural water transport. Brief studies from Madagascar offer a few indications of the potential of that country.(Government of Republic of Sierra Leone, 1995). Conditions in Latin America are still unclear. A brief report from Peru points out the importance of water transport for Amazon tribes, but offers only a little information regarding analysis or policy formulation.

Rural water transport in Bangladesh has already been scrutinized in more detail than in other countries. The studies mentioned above give attention to water transportation since the end of the colonial era. Now there are ever more projects being carried out to further penetrate and support this sector, and also wider studies regarding rural access and transport. The results of the projects in Bangladesh provide some study models for other countries. These studies also provide thorough data regarding social analysis and economy.

Some important issues from the Bangladeshi reports are:
a) This sector's capacity is much larger than is indicated by formal statistics.
b) Boat owners are able to improve and mechanize their boats, yet are hindered by capital.
c) The lack of support and respect from the government for this sector
d) The operators are often disrespected by officials and functionaries.
e) The conditions of waterways and docks must be improved.
f) This sector is seen as backwards and not conducive to development, which results in very little investment in this sector.

Rural water transport studies in Indonesia illustrate the physical infrastructure together with facilities for water transport in remote areas. Seen from the policy side, application has already taken place in areas still controlled by the local government. Governmental regulations still encompass shipping vessels. This concern will provide clarification for the development of rural water transport which is still of paramount importance to Indonesians who live on isolated islands. There are important issues in various studies already carried out, among others:
a) efforts at improving the capacity of water transport in order to support nationwide developmental balance
b) improve the service response for water transportation users
c) strengthen institutional response for developmental planning
d) minimize environmental impact as a consequence of energy use

Other reports describe a positive description about the condition of water transportation system in Indonesia which cover the management and infrastructure of water transportation, also the policy of water transportation development.

Studies conducted in Palembang, South Sumatera gave the information about he development of channel network which useful as alternative transport infrastructure. This was possible because the ground condition of east coast of South Sumatera is not possible for land transport. This study was trying to view the use of channels, which at first only for irrigation, can be used as alternative means to support goods and service movements. The water transportation network that is using these channels is a part of the inland water transport.

The government of Indonesia is trying to conduct a program to develop inland river traffic. The research is covering the arrangement of river network improvement and fleet to provide traffic that forecasted in the project in 2020 and to compare it with alternative traffic means, in the study in South Sumatera was compared with train. The conclusion is, the transport cost by water and train in study area is the same, but with water transport other benefit is gained (in environmental point of view).

Government reports on water transport have long neglected or disregarded it. Many negative comments about the safety and the lack of regulation. Because the social context of rural water transport has its roots in the informal sector and is forgotten by the government, owners, operators and users tend to have a weak influence on the creation of regulations. Yet even so, there are some encouraging signs in some countries, as with the existence of organizations which work together to make these problems known.

In some reports it was found that almost all boats are constructed from wood, whether in Peru, Madagascar, Viet Nam or Bangladesh. Almost everywhere, small canoes (capacity 2 or 3 people) were made from dugout logs, yet in parts of Africa this technique is used for larger boats.

Only the reports from Bangladesh explained the results of projects being implemented or initiatives being made to improve conditions or effectiveness of rural water transport. Aside from this one exception, all projects already made consisted only of a diagnostic study, and recommendations for change. Reports on implementation still are lacking.

With the exception of the reports from Bangladesh, at this time there is only limited information to understand the social context or economic conditions of rural water transport. This is a serious shortage for the creation of policy.

3. GENERAL ILLUSTRATION OF STUDY LOCATIONS

Indonesia is located between 6°08’N and 11°15’S and between 94°45’E and 141°05’E. Indonesia is a maritime nation with a sea area of about 7.9 million square km (including the Exclusive Economic Zone) or 81% of its total area, with a coastline of 80,000 km and total navigable river length of 21,579 km (compared to 300,000 km of roads).
Indonesia is a nautical country and an archipelago state. And with reason, because almost two thirds of its territory is nautical and scattered over more or less 17 thousand islands, large and small. The 7.9 million square km aquatic area of Indonesia gives its people basic sailing know-how with which to develop the economy.

The province of South Sumatra consists of areas having varying characteristics. The western

area, located close to the clusters of Mt. Barisan has mountainous and hilly landscape characteristics (high plain). In this area are found many springs which become large rivers in South Sumatra. To the contrary, the eastern part has a low contour with a few marshy locations. This condition makes this an area for river flow. The width of river channels in South Sumatra makes it very possible for them to be used by motorboats, especially if the riverbed is not too steep. Thus upstream travel against the current and downstream travel with the current can be accomplished with almost the same level of difficulty. Research location was on Galih Sari Village, which is located along the riverbank of Lalan River and Talang Pangeran Village at Ogan River. In general both villages have characteristics as a rural area, which still rely on water transport as a mobility infrastructure to public facilities such as school, market, hospital and office (work place).

Research also conducted in Riau province. It is situated in a flat and aquatic area. In the aquatic zone are found 3,214 large and small islands. 743 of these islands are already named, while the rest are not. The majority of these small islands scattered in the South China Sea are uninhabited. The case study in Riau Province was carried out at Okura and Selat Panjang Village (Figure 2). Okura Village is located in Tualang District, in the flow area of Siak River. Meanwhile, Selat Panjang is the capital of Tebing Tinggi District in Bengkalis Regency.

The third study area is West Kalimantan province that also known as a province of “a thousand rivers”. This is appropriate because here are found hundreds of rivers, large and small, which are often sailed. Some of the larger rivers even to this day are major arteries and highways for transport into the hinterlands, even though surface road infrastructure already reaches a large part of the sub-district. The primary large river is the Kapuas, which is also the longest navigable river. Of its total length of 1,086 km, 942 km is navigable.

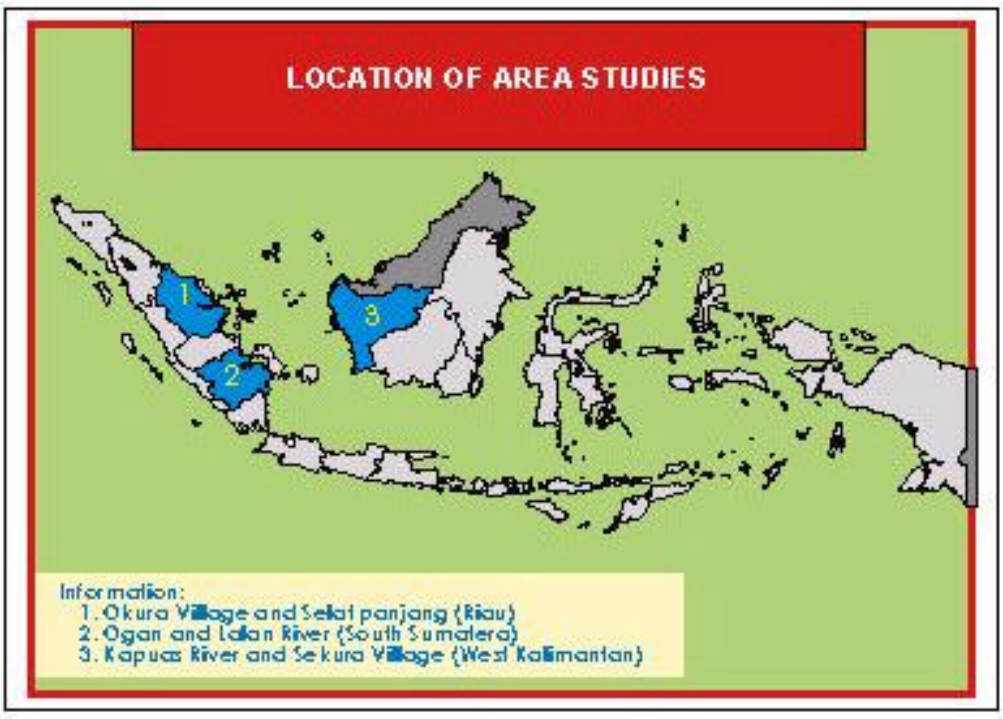

Figure 1. Location of Area Studies

4. MAIN FINDINGS

4.1. Data Collection

Two kinds of data were gathered during the research by field survey, they are qualitative and quantitative data. The data were collected by primary and secondary survey. Primary data were collected straight from the field by interview and observation (in-dept interview), meanwhile secondary data were collected from related institutions and previous studies. Quantitative research comprises all the research data on boat characteristics and stream channels, socio-economic data directly linked to passengers, operators, traffic volume and frequency of passengers and freight, and supporting river transport (for example boat workshops, docks, spare part vendors, fuel sellers, etc.), Meanwhile socio-cultural issues, group psychology, societal perceptions, people's requirements for transport tools, community hopes and worries, and the safety level of river transport all fall within the scope of this qualitative research.

Analysis conducted in this research covers: RWT policy in the study areas, Current water transport characteristics, The development of traditional water transport in study areas, user's social economy conditions, river's technical conditions, shipping safety and security, financing Rural Water Transportation, boat Operational Cost.

4.2. Water Transportation Development in Study Area

Study locations consisted of areas in Indonesia known to have extensive rivers and inhabited islands. People in areas studied considered water transport an important element within the area transportation system. Role and demand of water transportation are influenced by the level of need of users. Study areas in South Sumatera, Riau and West Kalimantan, are located on riverbanks and lack of land transportation. People's accessibility still relies on water transport because it is only available in those areas.
The following tables depict water transport development within the study area:

Table 1 Water transportation development in South Sumatera (unit boats)

Type of Boat	1992	1993	1994	1995	Seats
Jukung[1]	582	587	676	716	45
Parallel boat	66	91	93	84	NA
Ketek[2]	450	660	736	763	20
Speedboat	32	122	106	81	10

Source : Transportation Department South Sumatera Provincial Office, 2002

[1] **Jukung and Water Truck/Bus:** Large sized engine boats mainly used for carrying freights (30-60 tonne) for a long-haul trip

[2] **Ketek:** Medium sized engine boats for carrying goods and passengers (upto 12 passengers) used for short distance travel;

Table 2. Water Transportation Development in Riau

Type of Boat	1998	1999	2000	2001	Seats
Speedboat	61	111	125	130	10
Klotok/Dugout[3]	989	723	792	780	7
Long Boat	NA	23	7	5	25
Iron Tongkang [4]	2	61	70	75	Na

Source : Transportation Department Riau Provincial Office, 2002

Table 3. Water Transportation Development in West Kalimantan

Type of Boat	1997	1998	1999	2000	2001	Seats
Motorized Bandung	1,043	1,362	885	803	676	50
Non motorized Bandung [5]	320	613	406	394	254	20
Motorized boat	10,113	10,342	6,850	6,631	3,254	10
Parallel Tongkang	1,102	1,112	761	701	421	Na
Towing boat	68	68	101	82	215	Na
Motorized Tanker	52	59	126	114	92	Na
Non Motorized Tanker	203	218	199	183	138	Na
Long Boat	2,271	2,830	2,262	1,997	830	25
Speed Boat	774	786	594	578	486	10

Source : Transportation Department West Kalimantan Provincial Office, 2002

Table 1 to Table 3 show the availability of water transport fleet in 3 provinces. Each province experienced different situation, in South Sumatera the availability of water transport fleet in general is increased from 1992 to 1995. This condition occurs because the local government is opening rural areas surround Ogan and Lalan River. Therefore in these areas, accessibility still relies on water transport for inter village mobility. In Riau the availability of water transport fleet tends to increase and in several boat types are decreased. Meanwhile in West Kalimantan, the availability of water transport fleet declined drastically. This occurs because many people change their mode of transport from water to land transport with consideration that land transport will be faster and cheaper. Water and land transport development in this province is competing tightly, different from the situation in Riau and South Sumatera where water and land transport support each other.

4.3. User characteristics

Most of the passengers use water transportation for commerce and shopping purposes, their average destination is local market. Several people use it for family purposes, visiting relatives for instance, where the destination is difficult to reach by land transportation.
Peak hour occurs at 6 to 8 a.m., and between 12 to 3 p.m. Dugouts and non motorized boats are owned privately, usually by farmer who use it as private mode.

[3] **Dugout: a** non-motorised wooden boat. Generally for private use, including for fishing;

[4] **Tongkang:** a non-motorised barge. They are either made of steel (large ones) or wood (smaller ones). They are used for mainly carrying mining and forest product products;

[5] **Bandung/Houseboat:** Mainly found in West Kalimantan. The upper portion of the boat houses the owner. They are also used for transporting passengers and freights.

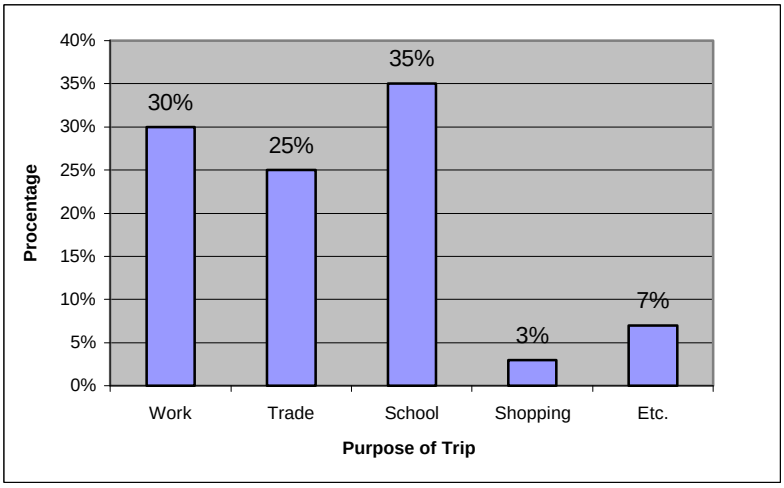

Figure 2. Trip purposes for river transport
(Source : Survey result, 2002)

Working and trading are the main purposes for people who use water transportation. The traders not only use motor boat to carry their goods but also as a place to trade itself. River transportation also used for education purposes, which shown that surrounding people are well concern about their educational matters. Field survey revealed that most of the travelers are male 69% and female 31% as comparison. The average age is in productive-ranged age, which is 25-35 respectively. This data indicates that elderly, women, and children are reluctant to use water transportation, especially for comfort matters. Water transportation facilities such as boat and pier remain unable to accommodate the interest of women and children. The elderly and women face extra difficulties in riding boats with regard to safety and comfort of clothing worn by women. The comfort and safety of the elderly and even women in the utilization of water transport is still quite relevant. People will still feel safe and comfortable wearing sarongs, skirts or other clothing when they get on the boat if there is a pier which connects to the boat, making getting on and off easier. Even with those limitations, women still use water transport as transportation mode to reach the market, office and other social activities (visiting friends, lottery party, wedding ceremony and others). Poor residents in study areas also use water transport to load marketing goods that are agricultural and plantation products. Most of the residents are farmer, therefore the need for agriculture equipment such as fertilizer, seeds and tools. Type of goods which are transported by water is bulk material such as rice, wheat, oil and woods which produced from the forest along the river. Freight movement on water in Riau starts from rural area form in row product, which will be sold in the nearest town. Beside for marketing row product, water transport are also a choice to market half -final and final products.

Table 4. Type of goods moved by water transport

Type	Riau	South Sumatera	West Kalimantan
Bulk	√	-	√
High Value	√	-	√
Agriculture product	√	√	√
Plantation	√	√	√

Source: Survey result, 2002

In South Sumatera freight transport by water is used to transport agricultural and plantation product to the market. There are also floating markets, where traders use their boats as trading place. Most of the freight type is row products, which will be shipped to other area as material to produce final product. In West Kalimantan particularly in study areas, freight mobility by water ia high, either for shipping row material from rivers or cultivated areas. In Sekura as rubber producer, use boats to transport rubber sheets (half-final materials) to the nearest city and to be processed at factories. Water source in study areas are easy to found, therefore the residents won't need water transport to fulfill their need of water.
The following table described the percentage of type of water transport at study areas:

Table 5. Percentage of water transport usage (%)

Type of engine		Study Area		
Motorized	**Non Motorized**	**South Sumatera**	**Riau**	**West Kalimantan**
Speed Boat		16	13.79	1.75
Jukung		8	-	-
Tongkang		15	-	-
Boat		6	27.59	95.27
	Ketek	55	-	-
	Dugout	-	17.24	2.98
Pompong		-	31.02	-
Ferry		-	10.34	-

Source: Survey result, 2002

4.4. Operation and safety

Water transport safety is felt to still be lacking, because some of the passengers rely only on their ability to swim and thus rely on themselves. Insurance is not yet available for this water transportation service. If seen from a practical standpoint, in inland, coastal and even open sea water transport operations, it is as if safety and regulatory concerns are in inverse proportion to water transport business profitability. A large part of the incidents and accidents involving water transport occur because of overcrowding. Passenger and freight totals that exceed capacity happen because demand for capital return an even a minimum "rental fee" level expected by the boat owner and the low level of safety monitoring service provided by the government

These two issues are an important aspect in determining whether water transport will become a viable alternative mode of transportation in the future. The existence of an uncertain number of passengers having experienced accidents is an important cause for concern. It must not be forgotten that the users of water transportation are in the "vulnerable" or susceptible category. Safety issues are very closely linked with business competition. This kind of highly competitive environment will create a demand for low quality. Thus, service safety, which should be a minimum requirement, is sacrificed.

4.5. Boat Operational Cost Analysis

To finance boat operation, which has to be done by the owner, the government tries to facilitate the need of the operators and the users by fixing the tariff. Tariff rate will determine

the operator's income and at the same time show the cost for the users. Tariff should be in the range of passenger's ability to pay but still guarantee feasible income for the operators.

In general cost structure is comprises of 2 groups i.e Fixed Cost and Variable Cost. Fixed Cost is not affected by production rate, while variable cost is. In transport business, cost factor is not a direct production function but more determine by production rate, which identical with the service that in some conditions those services are not needed. Income rate is depending on the actual production .In the calculation there are several cost components that can be calculated based on certain unit that have a standard value, nevertheless there are also cost component that calculated based on estimation. For the accurate calculation of the cost component, we need a good documentation system for those costs during the boat operation. The BOC (Boat Operational Cost) for each study location are summarized below.

Table 5. The BOC (Boat Operational Cost)

Type	**In South Sumatera**			
Boat Type (Engine/Non-Engine)	**Engine**	**Engine**	**Engine**	**Engine**
Type of Contain	Freight	Freight	Passengers	Passengers
Total Operating Cost	US$ 1.25/tonne -km)	US$ 1.05/tonne -km)	0.042 (US$/km/ passenger)	0.056 (US$/km/ passenger)
Type	**In Riau**			
Boat Type (Engine/Non-Engine)	Engine	Engine	Engine	Engine
Type of Contain	Passengers	Passengers	Passengers	Passengers
Total Operating Cost	US$ 1.12/tonne -km)	US$ 1.2/tonne-km)	0.0442 (US$/km/ passenger)	0.0339 (US$/km/ passenger)
Type	**In West Kalimantan**			
Boat Type (Engine/Non-Engine)	Engine	Engine	Engine	Engine
Type of Contain	Freight	Freight	Passengers	Passengers
Total Operating Cost	US$ 1.25/tonne -km)	US$ 1.21/tonne -km)	0.042 (US$/km/ passenger)	0.056 (US$/km/ passenger)

Source: Consultant's analysis, 2002

South Sumatra possesses great potential for the development of its water transportation. It lacks support in the form of government attention to its development. Its proportion of government funding for 2002 was about 0.4%. Currently the government tends to be more concerned with the feasibility of land transport tools. Riau Province, in 2002 the transportation sector received 38% of the total budget, and of that 38%, land transportation received 64%, while water transport was allocated only 9% (the remainder went to air transport). Considering the fact that Riau is 73% aquatic, water transport should be more of a development priority. This creates an imbalance, with the result that water transport is obviously being left far behind compared with land transport, even though, in reality, it is cheaper to develop water transport because the roadway, that is, the river, is already in place (lowering road construction costs), and the maintenance costs are cheaper (periodic river dredging). From this we can reach the conclusion that water transportation development will be much more inexpensive and profitable compared to land transportation if only the government would intensify their attention and intentions in this sector. For West Kalimantan Province, funds allocation for

water transportation development is felt to be very minimal. For fiscal year 2002/2003, funds allocation for the development of all transportation tools and infrastructure totaled 4% of the budget, while water transportation's portion was about 7.2% of total transportation sector calculations, compared with budget funds of 0.7%. The water transport sector in West Kalimantan still needs a great deal of attention from the local government, keeping in mind the unsatisfactory level of its development in the face of the great needs of the rural population.

Table 6. Recapitulation of main findings

Item	Description
Extent of waterways	The report provides figures for three study provinces: • **South Sumatera : Road length: 15,228 km; navigable waterways: 1880 km** • **Riau :** Road length: 13,632 km; navigable waterways: 1550 km • **West Kalimantan:** Road length: 8,141 km; navigable waterways: 2,473 km
Modal share (Country 1999)	Passenger: Road – 85,6%; Rail – 0,1%; Water – 7,2%; Air –7% Freight: Road – 62,3%; Rail –0,3%; Water – 37,5%;Air –0%
Estimated Country Usage	Passenger: 1,97 billion passengers/ year Freight: 811 million tonne/ year
National Trend	The report provides no numerical figure on the national trend. "The condition of development of water transport seems to be stagnant as a result of the expansion of land transport and the decrease in demand," commented the report. The report provides year-wise figures of number of types of boats in two of the three study areas. The trends are mixed. • In the case of South Sumatera the number of boats increased at a simple rate of approx. 16% from 1992 to 1995 • In the case of West Kalimantan the number of boats decreased at a simple rate of 15% from 1997 to 2001. A modal shift from water to land transport is said to be the main reason for such a decline.
Employment	No such information is available from the report. However, given the study area inhabitants' dependence on the water transport, it seems that a considerable number of people are involved, directly or indirectly, in the operation and maintenance of the boats and its related infrastructure.

Table 6. Continued

Item	Description
WHO (Users)	- Rural people from all social classes as the villagers in the study areas have very little choice other than using water transport; - Majority of the travelers are male (69%); - Elderly persons and children are the occasional users of the water transport; - Unsuitable infrastructure in boat landing places deters the women and elderly from using water transport extensively. - There do not seem to be any cultural barriers for women from using water transport.
WHAT	The boats mainly carry: agricultural, forest and fish products, mining products from the villages to the urban centers and mainly consumer goods to the villages from the urban centers.
WHERE	Short distance (<10/15 km): Due to the lack of any other choice, villagers use water transport in both the seasons – dry and wet. Long distance: Villagers also depend on the water transport for a long distance travel.
WHY	The study areas are located on riverbanks and they lack land transportation. Therefore, the inhabitants of the study areas have few options than using water transport in accessing facilities and services for carrying out their livelihoods. The study areas heavily dependent on water transport for accessing the following facilities and services: **South Sumatera**: schools, markets, hospital and work places; **Riau**: schools, markets, hospital and work places **West Kalimantan**: schools, markets, hospital and work places (please refer to page 2-12. Villagers also use boats for accessing rice fields, fishing sites etc. Water transport is also used to transport marketable agricultural, forest and fish products to nearby primary or secondary markets. The villagers also use boats to transport consumer goods from markets to the villages.
WHEN	The report provides no information on the extent of seasonal variations. However, it seems that there is very little seasonal variations in the use of water transport. Market days influence the demand for water transport considerably. Also the high-low tides influence the operation of the water transport – especially in West Kalimantan Province.

Table 6. Continued

Item	Description
HOW	The main forms of country boats are: - **Ketek:** Medium sized engine boats for carrying goods and passengers (upto 12 passengers) used for short distance travel; - **Speed Boat:** Medium engine boats for carrying passengers (up to 12 passengers) for a long haul trip; - **Jukung and Water Truck/Bus:** Large sized engine boats mainly used for carrying freights (30-60 tonne) for a long-haul trip; - **Tongkang:** a non-motorised barge. They are either made of steel (large ones) or wood (smaller ones). They are used for mainly carrying mining and forest product products; - **Dugout: a** non-motorised wooden boat. Generally for private use, includeing for fishing; - **Bangung/Houseboat:** Mainly found in West Kalimantan. The upper portion of the boat houses the owner. They are also used for transporting passengers and freights.
Owners	The report mentioned that most of the villagers in the Riau Province own dugout canoes or boats. Boats are said to be individually owned. The owner of a boat is generally the captain of the boat as well.
FARES AND OPERARING COSTS	**Passenger fare:** • South Sumatera: Weighted average fare - $ 0.023/km • Riau: Weighted average fare - $ 0.05/km • West Kalimantan: Weighted average fare - $ 0.045/km • Overall: weighted average fare - $0.039/km **Operating Costs:** • The research calculated operating costs for four types of boats without providing the name of the boats. • **Operating costs of passenger boats** : range from US$0.03 per passenger-km (for a 14 m long engine boat with carrying capacity of 30 passengers) to US$ 0.056 per passenger-km (for a 16 m long engine boat with carrying capacity of 45 passengers). The calculated average operating cost per passenger-km is US$0.041 per passenger-km • **Operating costs of cargo boats** : Not clear from the report.

5. CONCLUDING REMARKS FOR FUTURE WORKS

This report already provides a picture of the conditions in the 3 case studies and some strategic issues collected from qualitative surveys, supported by quantitative data. Some of these strategic issues show that governmental policy change can be found in water transportation management, together with its operational support. Some necessary aspects, however, that also deserve attention and are not yet found in this report are the point of view and perspective of the central government in means of encouraging and promoting this water transport. Thus, the results of this study truly accommodate obvious needs in the field and even regional/national development needs. With this initial information, it is expected that various recommendations can be tendered, regarding further academic study from this research, as well as those concerning development contributions, in the form of direct implication recommendations from this transportation research as means to locate water transportation, primarily in rural areas in the wider area development context.

Future research works should be directed to the followings:

1. Research on the need of infrastructure and the construction of piers / boat docking facilities and working units with the separation docks used for the loading and unloading of freight from those docks used for passengers.
2. Research on the need of improving boat safety means everything related to equipping a boat in accordance with safety standards, boat usage in accordance with its primary function, and cargo loading which does not exceed the capacity limit conditions, together with the training of a person or boat pilot who is genuinely capable and has mastered the route to be covered.
3. The need for government orientation to greater develop water transportation through various policies that support water transportation.
4. Water transportation infrastructure development is truly more inexpensive than land transportation development, because the roads used by boats, namely rivers, are already in place. Compare this with the construction of a new road, which will require the freeing of land, paving, and supporting infrastructure that certainly will be much more expensive.

ACKNOWLEDGEMENTS

The authors would like to thank the International Forum for Rural Transport and Development (IFRTD) and the Provincial Government of Riau for providing grants ti undertake the research. The author also indebted to local researchers Mr.Akhmadali, Mrs. Ida Rahayu and Mr. Rahmad Rahim as well as the local government counterparts.

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