

PROBLEM AND SOLUTION OF ROADWAY AT REMOTE AREA IN EAST KALIMANTAN

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ABSTRACT

Busang is a sub district of Kutai Timur Regency in East Kalimantan. Busang locates on N 00° 49' 35" and E 116° 33' 13", approximately 225 km north of the coastal city of Samarinda, and its area is about 3.722,16 km². Access to Busang area is through roadway or waterway. The problem is the roadway to Busang area don't have the permanent road. All roadways were built by many companies such as forestry-industry-based, logging-based, and palm plantation companies. The lack of infrastructure particularly roadway is disadvantage. The roadway was built with the coral material. In the rainy season, the surface of road changed becomes a heavy mud in many locations. At these locations, many vehicles cannot pass due to the depth of the heavy mud on the road is about 1 meter. Up to present, roadway is used as media for carrying goods and passengers from Samarinda to Busang and waterway is used for carrying fuel oil. Based on the direct observation and the structured interview on many people who use the private-light vehicle and motorcycle, the result of research will be showed in the following data. The travel time by light vehicle and motorcycle from Samarinda to Busang area is about 7 hours. The transport cost of goods is IDR 867 per kg and by light vehicle is IDR 325.000 per passenger and by motorcycle is IDR 40,000 per trip. Accessibility, mobility and efficiency of transportation to Busang area can be increased by building the new permanent roadway based on the standard road. In addition to building the new permanent road, making a periodic maintenance, monitoring the use of this new roadway in order to prevent a truck that use this new road where its tonnage is more than the road carry.

Keywords: roadway, remote area, Busang area, East Kalimantan, travel cost

1. INTROCDUCTION

Busang area is one of many sub districts of Kutai Timur Regency in East Kalimantan. This area has the geographical coordinate of N 00° 49' 35" and E 116° 33' 13". Sub district Busang consists of 6 (six) villages and its population number is 5.142 people [1]. The travel length is approximately 225 km north of the coastal city of Samarinda and its area is about 3.722,16 km square.

The geo morphology of Busang area is a hilly area and at this area is available the Atan River. There are many of deposits that has enormous amount of a natural resources such as coal, iron ore, and other minerals [2].

In 2010, a coal mining will be operated in Busang area. Mining activities, however, also result in serious consequences for the environment and society - locally and globally. Problems have resulted from land clearance, particularly in the case of strip coal mining, processing, or waste products that many mines produce. Mining destroyed natural habitats, polluted the air, soil and river [3].

At present, Busang is one the upstreams area of Mahakam River where has been changed to become an agricultural area. In this area, there are population settlements where all populations work as farmers. In general, they plant rice paddy based on a local wisdom. In order to increase their income recently many farmers try to plant natural rubber trees that its seed and fertilizer is provided by local government.

As an isolated area, generally, there is the lack of infrastructure particularly in the sector of electrical power and road network. These problems because the accessibility to this area to become relatively difficult. Lower accessibility and higher transport cost causes the price of commodities that come from other area goes up. In addition to the higher price of commodities, the commodity-daily stock is limited. Intensity of traffic of goods and people depends on the weather. In the dry season, the traffic of these is relatively increasing and the contrary, in the

rainy season, intensity of the traffic of people is lower due to the surface of roadway becomes a heavy muddy surface of roadway.

All of people who live at population settlements in Busang area is Dayak ethnic. For them, the Atan River has an enormous amount of value in daily life due to the river is used waterway, water sources for drinking, bathe, toilet, washing dresses and the source for food, such as fish. Up to present, all Dayak ethnics have a close culture with rivers

In 30-years ago, Busang area is a rainforest area. In the era of Soeharto regiment, this rainforest area converted becomes a critical area where is caused by the activity of the illegal logger, the forest-based companies. And in Busang was available the massive conversion to deforestation. Many of the critical areas changed becomes a agricultural land and the others is exist as a critical area. Figure 1 shows the location of research in Busang area and figure 2 shows the location of Kutai Timur Regency in the East Kalimantan Map.

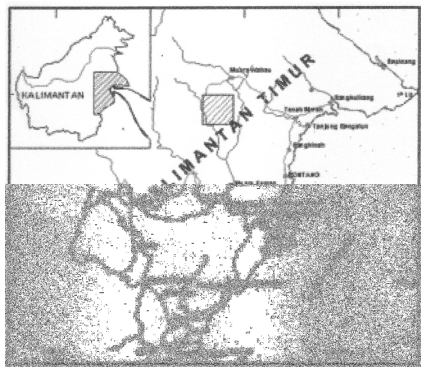


Figure 1. Location of Busang in East Kalimantan Map [4]



Figure2. Kutai Timur on East Kalimantan Map

ROADWAY

Infrastructure

In fact, Busang is a remote area in east Kalimantan. Although Sangatta is the capitol of Kutai Timur Regency, the travel length from Samarinda to Busang is shorter than from Sangatta to this area. The trip from Sangatta to Busang area through roadway always pass through due to the trip from Sangatta to Busang area through roadway is not available. The travel time from Samarinda to Busang area by a light vehicle travel time is about 7 hours and the average speed especially in the dry season is 40 km per hour. The travel length from Samarinda (Jl. Pahlawan street) to Busang especially to Long Nyelong village is only about 225 Km. The hot-mix surface of roadway is about 55 Km. The other of its surface was built of a coral, land-coral-composed, including 115 km built of coral in periodic maintenance from palm plantation companies (Figure 3 and Figure 4), and other land surface of roadway has been 55 km.



Figure 3. Access to Busang through a coral roadway



Figure 4. A coral roadway in the dry season

The coral-constructed surface of roadway that its length is 115 km belongs to Surya Hutani Jaya Company. The periodic maintenance is taken by this company and this periodic maintenance takes time when there was the harvest time. This roadway is often used by travellers as the main road from Samarinda to the other sub districts such as Sub

district Muara Ancalong, Muara Bengkal, Muara Ancalong, Long Mesangat, and Muara Kaman. In 2010, a part of this route will be built with a permanent road and this roadway will become a provincial road.

Because of this roadway is no permanent construction, the surface of road enveloped by mud, especially in the rainy season. In many locations, the surface of road changed becomes a heavy-muddy surface (Figure 5). At various locations vehicles cannot pass this road (Figure 6) because of the surface of road is about 1 m in depth.



Figure 5. A heavy-muddy surface of roadway



Figure 6. A stopped vehicle due to the heavy-muddy surface

Busang area consists of 6 villages but the only 3 villages where connected with roadway, including Long Nyelong, Long Lees and Long Pejeng village. The other villages, including Mekar Baru, Rantau Sentosa, and Long Bentuk village connected through waterway. Although 3 villages have connected, the quality of the road is relatively bad. In other words, the quality of road is non standard due the construction of it was made of the low quality of cement and the average width is 1.5 m. Figure 7 shows a road at Long Pejeng village and figure 8 shows a road at Long Nyelong village.



Figure 7. A road at Long Pejeng village



Figure 8. A road at Long Nyelong village

Although 3 villages connected by roadway, the quality of the road connector is relatively bad. Decreasing the quality of it is caused by the unavailability of the drainage at roadside. In addition to the problem of drainage, this roadway is taken not periodically care. In the rainy season, these roadways are difficult passed by using motorcycle and endanger the bikers of motorcycle because the surface of roadway enveloped mud is available many holes.

Transport mode

Up to present, the bus service is not available to Busang area from many cities. The trip to this area can be only served by a light-private vehicle that so called taxi. The bus service is only available from Samarinda to the designed route of the neighbor of Busang area such as Long Mesangat and Muara Ancalong. From these areas the trip to Busang can be continued by private-light vehicles.

The number of the private-light vehicles that serves the trip from Samarinda to designated route where so-called above is about 500 units. The origin of vehicles is from its terminal where locates at the side of Islamic Center in Samarinda. In general, departure of vehicles from Samarinda the designated route is at early morning.

Motorcycle is an alternative mode for people who live at population settlements in Busang area. This mode is used in the daily activity. A motorcycle can pass a location of roadway in the heavy-muddy surface but a biker spent many time to pass this location or wasting time (Figure 9). Many people use motorcycles as mode to Samarinda.



Figure 9. A biker tries to pass a heavy-muddy surface



Figure 10 . A vehicle on the timber bridge

Accessibility

Busang area is alike an island. Busang area is similar an island and this area can be accessed through roadway. The lack of infrastructure, such as the bridge on the Atan River is not available, causes Busang to become an isolated area. Vehicles cannot go directly to Busang area due to Busang area is surrounded by the Atan River. As replacement of bridge is a ship that crosses vehicles and a wood-constructed bridge which connects a village with a riverside of the Atan River (see figure 10). All vehicles have to being crossed by a special-crosser medium-sized ship, namely Katingting (Figure 11). A medium-sized vehicle such bus and truck cannot be crossed due to the capacity of Katingting is limited. In other words, the size and capacity of Katingting can only for a small-size vehicle or light vehicle (Figure 12).



Figure 11. Preparation to cross a light vehicle



Figure 12 . A crossed light vehicle

2. METHOD

In this research, the research method to collecting data is semi-structured interviews and a direct observation. Users who use the truck service both small- and medium-sized ship were interviewed. Data of travel cost of passengers was obtained from users who oft use land vehicle and live in Busang. And travel cost of goods was obtained by interviewing owners of small shop. These data cover capacity of truck, travel cost, travel time, travel distance. Data which collected in this interview were 50 units. This research has taken time one week long, from 22 – 26 February, 2010 in Busang area.

Travel cost

Travel cost can be represented in money, travel time, travel distance, and its combination which is so called the united cost [6]. The total cost of travel is assumed by the number of the cost from each of the past route from Samarinda to Busang.

Goods transport cost

Goods, including household tools or appliances, are transported through roadway. Transport cost of goods by a pick-up truck depends on the weather conditions. In the rainy season, the transport cost of truck is increasing about 20% due to its travel time consumes a lot of time that is longer than the normal time. In general, people use a small-sized truck for carrying goods except for carrying a heavy tonnage of goods such as cement. The transport cost of goods is presented in the below equation (1) and (2).

Transport cost of the medium-sized truck

$$TC_{mg} = \frac{T_{ms}}{C_{ms}} \quad (1)$$

$$TC_{mg} = \frac{T_{ms}}{C_{ms}} + 20\% \frac{T_{ms}}{C_{ms}} \quad (2)$$

Transport cost of the small-sized truck

$$TC_{sg} = \frac{T_{ss}}{C_{ss}} \quad (3)$$

Where

TC_{mg} = transport cost of goods of the medium-sized truck (IDR/liter)

TC_{sg} = transport cost of goods of the small-sized truck (IDR/liter)

T_{ms} = cost of the medium-sized truck (IDR/kg)

T_{ss} = cost of the small-sized truck (IDR/kg)

C_{ms} = capacity of medium-sized truck (ton)

C_{ss} = capacity of small-sized truck (ton)

In the equation (2), transport cost of a pick-up medium-sized truck increases 20% in the rainy season due to this truck consumes a lot of time due to the movement of truck is lower than normal against the surface of road changed becomes a heavy-muddy surface of roadway and at several locations many trucks cannot pass this location.

In the equation of (3), travel cost of passenger depends also on the kind of vehicle and how many passengers picked up. In general, the kind of vehicle that serves passengers includes Avanza and Super Kijang. The other vehicle is a pick-up double-cabin differential-gear vehicle. Passengers prefer this vehicle to Avanza or Super Kijang due to this vehicle can pass a heavy-muddy surface of roadway in the rainy season.

Light vehicle travel cost

People from Samarinda to Busang and in return use vehicle by through roadway. Travel cost of each passenger depends on the sum of passengers in a vehicle and also on the weather season. The calculation of the travel cost is based on following equation.

$$TC_p = \frac{V}{C} \quad (4)$$

Where

TC_p = passenger travel cost
 V = light vehicle travel cost
 C = vehicle capacity

Motorcycle travel cost

Travel cost of people depends on the kind of motorcycle and its aging. In general, the travel length from Busang area to Samarinda is about 225 km. The equation of travel cost of motorcycle is in the following formula:

$$TC_{mc} = \frac{D}{C}$$

Where

TC_{mc} = travel cost of motorcycle
 D = travel length
 C = operational cost of motorcycle

The travel length from Busang area to Samarinda is about 225 km and the calculation of the operational cost depends on a kind of motorcycle and its aging. The operational cost is calculated based on the price fuel oil i Busang area. The price of gasoline in Busang area is IDR 7,000 per liter or IDR 125 per km based on assumption that the consumption of gasoline was 40 km per litre and the other operational cost is IDR 51.15 per km [7].

3. RESULT AND DISCUSSION

In general, people and goods are transported from Samarinda to Busang area and in return through roadway. The kind of mode that is used for transportation is light vehicle (taxi) and motorcycle. A pick-up truck is used as mode for carrying goods. A truck carries a agricultural commodities from Busang to Samarinda and in return this truck carries the need of household. Although a heavy truck can carry goods to Busang area, the heavy truck services is not allowed for carrying it because the condition of the non-permanent surface of roadway. In other words the surface of roadway that consists of coral and sand cannot carry the heavy tonnage of

A passenger vehicle consists of the two kinds of mode, including light vehicle (taxi) and motorcycle. A light vehicle is normally used as a passenger car in order to carry more than two passengers. The cost of travel fluctuates and depends on the weather season. In the rainy season, the surface of land road changed becomes mud and a light vehicles cannot go pass or run very slow. In other words, this mode will take much time in the way to Busang. The travel cost is increasing about 10% until 20% in the rainy season. In addition to increasing travel cost, the travel time consumes more time in comparison with the normal time. The average speed of a vehicle in the dry season is about 40 km per hour and its speed in the rainy season depends on the condition of surface of road. Sometimes, vehicles cannot go pass a location because of a heavy muddy. When passenger car could not pass a location, queue of vehicles created and passengers spent many time to wait until the surface of road was repaired. In addition to increasing travel time, the consumption of fuel is also significantly increasing. Table 1 shows data of transport cost of passengers and goods and other information in the dry weather.

Table 1. Travel cost of modes

| Kind of mode | Passenger vehicle | Motorcycle | Pick-up truck |
|--------------|-------------------|-------------|---------------|
| Capacity | 4 (except driver) | 2 | 1.5 tons |
| Schedule | non-reguler | non-regular | non-regular |
| Flexibility | non flexible | flexible | non flexible |

| Intensity | low | high | low |
|---------------|---|---------------------------------------|-------------------------------------|
| Travel length | 225 km | 225 km | 225 km |
| travel time | 7 hours | 7 hours | 10 hours |
| travel cost | IDR 1,300,000 /vehicle or DR 325,000 / passenger | IDR 176.15 /km or IDR 40,000 /trip | IDR 1,300,000 /truck IDR 867 /kg |

The transport cost of logistics by pick-up truck is IDR 867 per kg. This cost is relatively expensive in comparison with travel cost of goods in other cities. In other words, the travel cost for carrying goods is not efficient.

The travel cost by a light vehicle is IDR 325,000 per passenger and by motorcycle is IDR 40,000 per trip. These data show that travel cost by motorcycle is lower and more efficient than light vehicle (taxi or passenger car). Based on this reason many people choose motorcycle as mode of transportation from Busang to Samarinda.

Recently, the number of people who use motorcycle as mode for transportation from Busang area to Samarinda is significantly increasing. Travel cost of people using motorcycle is lower in comparison with passenger car and other advantage is people have choice for departure to Samarinda based on their need.

Up to present, a daily schedule of the trip to Samarinda is not available. The trip to Samarinda by passenger car is based on an order. Due to there is not a daily trip by this car, many people who live at population settlements in Busang area use an alternative mode such as motorcycle.

Due to there is not a bridge which connects Busang area to other area, vehicles cannot reach Busang area. For carrying vehicles, a ship is needed to cross vehicles. This ship is named as Katingting. This problem will increase a travel cost of passenger. The cost of travel of passengers and goods is calculated not only from Samarinda to Busang area but also the cost of crossing passengers, goods, and motorcycle using Katinting. In the other words, there is a extra cost for crossing passengers, goods, and motorcycle.

Infrastructure in Busang Area

Busang area consists of 6 villages but up to present the only 3 villages connected each other through roadway and another village connected through waterway. Mekar Baru and Rantau Sentosa village can be only reached from other village by ship. In fact, all villages locate in the same land but lack of infrastructure causes a lower accessibility and mobility. The travel time from Long Nyelong, Lees and Pejeng to Mekar Baru and Rantau Sentosa is about 30 minutes by a ship. In addition to the travel time, travel cost between these villages is very expensive. Although all villages are the part of sub district of Busang, the travel time and travel cost between villages are significantly different.

In 2011, there is a new master plan to build a new roadway that will connect Long Lees to Mekar Baru village and to Rantau Sentosa village. The length of a new roadway from Long Lees to Mekar Baru is 20 km and from Long to Rantau Sentosa village is 8 km. The existing of the new roadway will reduce travel time and travel cost to Mekar Baru and Rantau Sentosa. In addition saving money and time, building the new roadway will connect all villages through roadway and increase accessibility and mobility of people who live in Busang area.

4. CONCLUTIONS

Busang area is a remote area in the East Kalimantan Province. Access to Busang area is through roadway and waterway. At present, using the roadway as the traffic of people and goods is significantly increasing in comparison with waterway due to the travel time is shorter in time and travel cost is cheaper. In addition to these two reasons the traffic of people and goods is more flexible than waterway.

At present, the main problem of roadway is that the roadway was built of the coral material. In other words the quality of the roadway is non standard and in the rainy season, the surface of roadway in many locations changed becomes mud. When the waterway had enveloped a heavy mud, all vehicles could not pass these locations and Busang area became a isolated area.

In general passengers are not carried by the public bus service but being served by private-light vehicle and motorcycle and goods is carried by pick-up small- and medium-sized truck. The travel time from Busang to Samarinda is about 7 hours using private-light vehicle and motorcycle. The transport cost of goods is IDR 867 per

kg by truck and of the private-light vehicle is IDR 325,000 per passenger and of motorcycle is IDR 40,000 per trip by motorcycle.

Accessibility and mobility can be increased by decreasing the travel time and travel cost with building a permanent roadway and a periodic maintenance. In addition to building the new permanent roadway, a periodic maintenance, monitoring the use of this new roadway by truck that its tonnage is not more than the carry of the new road.

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