

The Influence of Vehicle Operational Cost on Building Material Fare and Basic Price (Case Study of Banjarmasin - Puruk Cahu Route)

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Abstract—Vehicle Operational Cost (VOC) of goods/material transportation greatly affects the delivery cost and the determination of destination basic price especially in Puruk Cahu. VOC must satisfy the requirements by calculating actual production cost, which issued by the owner of the transportation, to be government's foundation as the regulator of official fare transportation and unit price of building material in the future. This research analyze the amount of Vehicle Operational Cost (VOC) for truck to bring the building material from Banjarmasin - Puruk Cahu with conventional method, obtains ideal fare based on VOC calculation from the transportation owner in order to pay the production cost, and analyze how big is the influence of VOC upon the increasing of material building price in Puruk Cahu. Based on the discussion, several conclusions are obtained, such as VOC of Banjarmasin - Puruk Cahu route for building material transportation especially iron reinforcement material and cement are in amount of around Rp. 8.744,31 /km and Rp. 891,14 /ton.km. Building material transportation fare based on actual calculation from the sample profil obtains minimum transportation material fare in which Rp. 8.100,00 /km and Rp. 840,00 /ton.km with minimum weight 9 ton, meanwhile, the maximum transportation fare is in amount of Rp. 10.450,00/km and Rp. 1000,00/ton.km with 11 ton capacity. In addition, the average of transportation fare is in amount of Rp.8.848,44 /km and Rp. 902,81 /ton.km with the average transport 9,81 ton. Hence, it can be concluded that the existing material transportation fare is a little bit higher than the VOC calculation fare result for Rp./km and Rp./ton.km unit. Furthermore, the influence of the increasing of VOC fare for iron reinforcement material is in amount of 96,93% and portland cement in amount of 94,63% and the rest 3,07% for iron

reinforcement material and 5,37% for portland cement are affected by other factors.

Keywords— Vehicle Operational Costs (VOC), transportation fare, destination basic price.

I. INTRODUCTION

The development of Puruk Cahu citizen is in accordance with the development of its region and the increasing of citizen's economic activity. Citizen needs social interaction due to the commodity needs or other services which causes a travel and consequently it needs an instrument to make that travel easier. The number of travel demands to the related region is influenced by some important factors such as costs, characteristic of the transportation means, population in the origin region, income, and the main activity which can be done. One of the transportation's good guarantees is to ensure several things such as may carry people/things in a great number, safely arrive in the destination, and arrive fast with proper cost (efficient and effective) especially material transport claim. By remembering financial value which may be happen in goods transportation, so the determination of fare based on VOC is very dominant as the main factor that must be considered due to the wide effect, particularly on goods/material price determination between regions. This case study examines Vehicle Operational Cost (VOC) of goods transportation that affect cost and price of building material specifically in the City of Puruk Cahu. In this case, the effect of material transportation's operational cost in Banjarmasin – Puruk Cahu route that is not yet examined scientifically makes the basic of fare determination has not yet stipulated by the regulator. Hence, the transposition fare variance is affected and makes a not economic price of building material because of several factors such as long distance

to the main distributor, road infrastructure which partly insufficient, the doer and provider of transportation, and regulation of transportation funding. Based on the explanation above, this research aims to develop a calculation of goods transportation fare from Banjarmasin to Puruk Cahu, even though this development faces many obstacles due to the limited data that are used in this calculation. The result of the calculation is expected to be used as one of the instruments to know vehicle perational costs by using land vehicle in determining the official fare and to control the operation as effective as possible in order to predict future transportation cost. Based on the explanation above, this research aims to develop a calculation of goods transportation fare from Banjarmasin to Puruk Cahu, eventhough this development faces many obstacles due to the limited data that are used in this calculation. The result of the calculation is expected to be used as one of the intruments to know vehicle perational costs by using land vehicle in determining the official fare and to control the operation as effective as possible in order to predict future transportation cost.

II. LITERATURE REVIEW

2.1 Fare Determination Method

Stipulation of Directorate General of Land Transportation Number SK.687/AJ.206/DRJD/2002 about Technical Guideline of Public Transportation Implementation in Urban Area within Fixed and Well-Organized Route explains conventional fare determination method. In practice, the method can be applied with several adjustments needed. Fare is the amount of cost that charged to each transportation user and expressed in Rupiah. As for goods/material transportation, the level of price or cost that is paid by the user is per unit trip, weight, or per unit volume per kilometer. Fare determination is aimed to encourage maximum use of transportation infrastructure and facility. Calculating fare by using Vehicle Operational Cost (VOC) approach means the price is determined based on the operational cost plus several managements and profit percentages that permitted. Types of Transportation fare are explained as follows (Salim, 1993):

1. Fare based on Route, it is operational management of the transportation which operated by considering the distance traveled by related transportation.
2. Local fare, applicable fare in a region.
3. Different fare, it is different fare based on distance, weight, cargo, speed, or special characteristic of the transpoted goods.
4. Container on flat car fare, applicable fare to carry box in truck based on its size and the origin to the destination place.

2.2 Vehicle Operational Cost (VOC)

To make basic price calculation easier, cost classification using approach technique is conducted as follows:

1. Direct cost
 - a. Fixed cost

Includes vehicle depreciation cost, capital investment for vehicles, vehicle registration cost, vehicle testing cost and assurance both for vehicle and the crew.
 - b. Variable cost

Includes salary/crew premium of insurance, fuel oil, tire usage, regular checking, small service, big service, general checking, body and truck container repair, overhole and rebuilt, wasing truck, terminal/platform/port/warehouse and road levies.
2. Indirect Cost
 - a. Fixed Cost

Crew salary besides transportation crew cost, overtime money, social benefits, health and clothes benefits, as well as assurance. The staff besides crew consists of leader, administration staff, technical and operational. The number of staff beside the crew depends on the size of transportation.
 - b. Variable Cost

Cost of management, depreciation of office building, pool and garage, inventory/office equipment, and garage facility, electricity and water cost, telephone and telegram bill, official trip cost besides staff, company's tax, route and business permission, also marketing cost.
3. Additional expenses and profit

Transportation company is permitted to take additional expenses and profit in amount of 10% for vehicle operation.

III. RESEARCH METHOD

3.1 Data Collection Stage

Pengumpulan data primer ditujukan untuk mengetahui objek penelitian berupa:

1. Vehicle type and specification transport goods from Banjarmasin to the city of Puruk Cahu. Thus, it needs transportation data especially building material transportation and the movement of origin of building material;
2. Production cost and transportation fare;
3. Needed time for travel; and
4. Material specification in form of type, volume, and commodity weight records.

Secondary data are the available data. In this research, data source may be obtained from related institution. As for the data for supporting this research are as follow:

1. Population number, geographical condition, social and economy;
2. Banjarmasin- Puruk Cahu Map;
3. Data of unit price at Murung Raya Regency, 2017;
4. Spareparts data and truck operation service of the transportation.

3.2 Variable Identification

In order to obtain significant variable, this research uses several variables which are identified from the previous research. It is important to take into account the variable in calculating the total of VOC. The variables are:

- a. Internal factor of vehicle, such as cost of refined fuel oil (BBM), lubricant, tire, spareparts, maintenance, operator salary, retribution, permission, depreciation, and additional expenses/overhead.
- b. External factor, such as the price of iron reinforcement material and cement in 2017 in Banjarmasin and Puruk Cahu.

3.3 Data Analysis Stage

Analysis of VOC model is conducted through conventional approach with computer assistance in certain stage. The stages are as follow:

1. Analyze truck profil which pass by/transit on the research's study zone.
2. Run VOC calculation.
3. Analyze the available fare based on commodities weight which is carried.

4. Compare the ideal price based on VOC result with the available fare.
5. Analyze the increasing of basic price in the destination due to the influence of VOC.

IV. SURVEY RESULT

4.1 Survey Data

The survey result obtains from the first respondent in which freelance truck driver or individual service which owned a transportation instrument for delivery material between regions. The survey location of freelance truck driver is in the locations of loading and unloading building material or warehouse areas of building material stores in Puruk Cahu. It is done with a consideration to make the interview with truck drivers easier. The interview aims to know the production cost and observe type and weight of building material commodity in detail, as well as to record the used vehicle profil.

The second respondent is freight forwarding company or the company which gives service in collecting, manging, warehousing, and delivery goods/materials which have legality on its service. The survey locations are where their companies take place.

To ensure a high-quality product, diagrams and lettering MUST be either computer-drafted or drawn using India ink.

Table. 1: Fare of Goods/Material Transpotation by Freelance Driver in Banjarmasin – Puruk Cahu

No	Plat Number	Drivers' Name	Truck Type	FARE/TON
1	DA 1424 AL	FAHMI	MITSUBHISI CANTER PS 125HD	Rp 450.000,00
2	DA 1060 BG	BENI	MITSUBHISI CANTER PS 135HD	Rp 430.000,00
3	DA 9001 EF	MARDI	MITSUBHISI SUPER HDX 135	Rp 450.000,00
4	DA 1243 AM	YUDI	MITSUBHISI SUPER HDX 135	Rp 400.000,00
5	DA 1035 FD	PUTRA	HINO DUTRO 300	Rp 400.000,00
6	DA 1267 HB	IWAN	MITSUBHISI CANTER PS 135HDX	Rp 425.000,00
7	DA 8286 EF	ARIF	ISUZU ELF PS 120HD	Rp 450.000,00
8	DA 1998 FD	KASFI	MITSUBHISI CANTER PS 135HD	Rp 400.000,00
9	DA 1939 AK	HENDRA	MITSUBHISI CANTER PS 135HD	Rp 420.000,00
10	DA 9759 FE	ARAB	MITSUBHISI PS 120	Rp 450.000,00
11	DA 1046 EF	MARNO	TOYOTA DYNA 130HT	Rp 450.000,00
12	DA 1989 FE	KHUSAIRI	MITSUBHISI CANTER PS 125HD	Rp 425.000,00
13	DA 9750 E	SUGIANOOR	MITSUBHISI PS 120	Rp 475.000,00
14	DA 9145 WL	INDRA	MITSUBHISI CANTER PS 125HD	Rp 450.000,00
15	DA 8607 FE	JUMAIDI	MITSUBHISI CANTER PS 135HDX	Rp 420.000,00
16	DA 8250 MM	JANUAR	TOYOTA DYNA 130HT	Rp 450.000,00
17	L 9704 VU	MUSLIM	TOYOTA DYNA 130HT	Rp 425.000,00
18	DA 9430 AQ	JUNAIDI	MITSUBHISI CANTER PS 125HD	Rp 450.000,00
19	DA 8724 CF	TAUFIK	MITSUBHISI CANTER PS 135HDX	Rp 425.000,00
20	DA 9431 TW	HUSNI	TOYOTA DYNA 130HT	Rp 450.000,00
21	KH 8030 ET	SAFWANI	MITSUBHISI PS 120	Rp 450.000,00
22	DA 1060 FD	YUSUF	MITSUBHISI CANTER PS 125HD	Rp 425.000,00

Table. 2: The Average Number of Freelance Driver Shipment Every Month

No	Plat Number	Drivers' Name	Truck Type	Every Month Operation
1	DA 1424 AL	FAHMI	MITSUBHISI CANTER PS 125HD	8 Trip
2	DA 1060 BG	BENI	MITSUBHISI CANTER PS 135HD	6 Trip
3	DA 9001 EF	MARDI	MITSUBHISI SUPER HDX 135	6 Trip
4	DA 1243 AM	YUDI	MITSUBHISI SUPER HDX 135	10 Trip
5	DA 1035 FD	PUTRA	HINO DUTRO 300	8 Trip
6	DA 1267 HB	IWAN	MITSUBHISI CANTER PS 135HDX	8 Trip
7	DA 8286 EF	ARIF	ISUZU ELF PS 120HD	5 Trip
8	DA 1998 FD	KASFI	MITSUBHISI CANTER PS 135HD	6 Trip
9	DA 1939 AK	HENDRA	MITSUBHISI CANTER PS 135HD	6 Trip
10	DA 9759 FE	ARAB	MITSUBHISI PS 120	6 Trip
11	DA 1046 EF	MARNO	TOYOTA DYNA 130HT	8 Trip
12	DA 1989 FE	KHUSAIRI	MITSUBHISI CANTER PS 125HD	7 Trip
13	DA 9750 E	SUGIANOOR	MITSUBHISI PS 120	4 Trip
14	DA 9145 WL	INDRA	MITSUBHISI CANTER PS 125HD	6 Trip
15	DA 8607 FE	JUMAIDI	MITSUBHISI CANTER PS 135HDX	9 Trip
16	DA 8250 MM	JANUAR	TOYOTA DYNA 130HT	6 Trip
17	L 9704 VU	MUSLIM	TOYOTA DYNA 130HT	4 Trip
18	DA 9430 AQ	JUNAIDI	MITSUBHISI CANTER PS 125HD	8 Trip
19	DA 8724 CF	TAUFIK	MITSUBHISI CANTER PS 135HDX	6 Trip
20	DA 9431 TW	HUSNI	TOYOTA DYNA 130HT	6 Trip
21	KH 8030 ET	SAFWANI	MITSUBHISI PS 120	6 Trip
22	DA 1060 FD	YUSUF	MITSUBHISI CANTER PS 125HD	5 Trip

Table. 3: Expedition Shipment Fare

NO	COMPANY	POLICE NUMBER	TRUCK TYPE	FARE
1	CV. BERKAH RAHMAN	DA 1084 BG	MITSUBHISI CANTER PS 135HD	Rp. 500.000,00 /ton
		KH 8241 EP	ISUZU 120 PS ELF HD	Rp. 500.000,00 /ton
		R 1954 CD	MITSUBHISI CANTER PS 135HDX	Rp. 500.000,00 /ton
		AB 8490 ME	MITSUBHISI CANTER PS 125HDX	Rp. 500.000,00 /ton
		DA 1888 ED	MITSUBHISI PS 120	Rp. 500.000,00 /ton
2	CV.BARITO JAYA	DA 9727 CF	ISUZU 125 PS ELF HD	Rp. 475.000,00 /ton
		AD 1971 F	ISUZU 120 PS ELF HD	Rp. 475.000,00 /ton
		DA 1119 FD	MITSUBHISI CANTER PS 135HD	Rp. 475.000,00 /ton
		DA 1507 HB	MITSUBHISI CANTER PS 125HD	Rp. 475.000,00 /ton
		DA 1058 FD	MITSUBHISI CANTER PS 125HD	Rp. 475.000,00 /ton

Table. 4: Data of Expedition Transportation Banjarmasin – Puruk Cahu

NO	COMPANY	POLICE NUMBER	TRUCK TYPE	TRIP	GOODS COMMODITY WHICH CARRIED PER MONTH	
				PER MONTH	BUILDING MATERIA L TRIP	OTHER COMMODI TY TRIP
1	CV. BERKAH RAHMAN	DA 1084 BG	MITSUBHISI CANTER PS 135HD	8	4	4
		KH 8241 EP	ISUZU 120 PS ELF HD	8	2	6

		R 1954 CD	MITSUBHISI CANTER PS 135HDX	8	4	4
		AB 8490 ME	MITSUBHISI CANTER PS 125HDX	8	2	6
		DA 1888 ED	MITSUBHISI PS 120	8	1	7
6	CV.BARIT O JAYA MANDIRI	DA 9727 CF	ISUZU 125 PS ELF HD	8	3	5
		AD 1971 F	ISUZU 120 PS ELF HD	8	6	2
		DA 1119 FD	MITSUBHISI CANTER PS 135HD	8	6	2
		DA 1507 HB	MITSUBHISI CANTER PS 125HD	8	5	3
		DA 1058 FD	MITSUBHISI CANTER PS 125HD	8	4	4

4.2 Data of Production Cost Component (Vehicle Operational Cost)

The data which are obtained from expedition owner or truck owner informs VOC detail components consists of spare parts, service fee, unit price and usage frequency such as in Table 5.

One example of truck production cost calculation according to component unit price is:

Mitsubishi Canter PS 135 HD, Police Number DA 1084 BG

1. Direct Cost

1). Fixed Price

- a. Vehicle Registration : Rp. 2.700.000,00 with unit of 96.000 km so that

$$\frac{\text{Rp. 2.700.000,00}}{96.000} = 28,13 \text{ Rp/km}$$

- b. KIUER : Rp. 1.000.000,00 with unit of 96.000 km, so that

$$\frac{\text{Rp. 1.000.000,00}}{96.000} = 10,42 \text{ Rp/km}$$

- c. Depreciation : calculated in amount of 20 %
(Rp. 344.000.000 – (20% x 344.000.000))

$$\frac{\frac{20}{100} \times (\text{Rp. 344.000.000} - (\frac{20}{100} \times \text{Rp. 344.000.000}))}{96.000} = 13.760.000,00 \text{ Rp/year}$$

$$\frac{\text{Rp. 13.760.000,00}}{96.000} = 143,33 \text{ Rp/km}$$

2). Variable Cost

- a. Refined Fuel oil (BBM): Rp. 6.850 /liter with unit of 5 km so that

$$\frac{\text{Rp. 6.850}}{5} = 1.370,00 \text{ Rp/km}$$

- b. Tire usage (7 tires)

- a). Outside tire : Rp. 1.400.000,00 per tire with unit of 30.000 km so that

$$\frac{\text{Rp. 1.400.000} \times 7 \text{ pcs}}{30.000} = 326,67 \text{ Rp/km}$$

- b). Inside tire : Rp. 200.000 per tire with unit of 30.000 km so that

$$\frac{\text{Rp. 200.000} \times 7 \text{ pcs}}{30.000} = 46,67 \text{ Rp/km}$$

- c). Tire Layer: Rp. 50.000 per tire with unit of 30.000 km so that

$$\frac{\text{Rp. 50.000} \times 7 \text{ pcs}}{30.000} = 11,67 \text{ Rp/km}$$

- c. Small service every 8.000 Km

- a). Machine oil : Rp. 45.000 / liter with 8.000 km so that (Rp. 45.000 x 10 liter) / 8.000 km = 56,25 Rp/km

- b). Grease : Rp. 25.000 / kg with 8.000 km so that (Rp. 25.000 x 2 kg) / 8.000 km = 6,25 Rp/km

- c). Brake fluid : Rp. 75.000 / liter with 8.000 km so that (Rp. 75.000 x 0,52 liter) / 8.000 km = 4,88 Rp/km

- d). Front brake shoes : Rp. 100.000 /bh with 8.000 km so that (Rp. 100.000 x 2 bh) / 8.000 km = 25,00 Rp/km

- e). Back brake shoes: Rp. 100.000 /bh with 8.000 km so that (Rp. 100.000 x 2 bh) / 8.000 km = 25,00 Rp/km

- f). Service cost : 15% x (56,25 + 6,25 + 4,88 + 25,00 + 25,00) = 17,61 Rp/km

- d. Big service every 24.000 Km

- a). Transmission oil : Rp. 38.000 / liter with 24.000 km so that (Rp. 38.000 x 4 liter) / 24.000 km = 6,33 Rp/km

- b). Axle oil : Rp. 40.000 / liter with 24.000 km so that (Rp. 40.000 x 4 liter) / 24.000 km = 6,67 Rp/km

- c). Grease : Rp. 25.000 / kg with 24.000 km so that (Rp. 25.000 x 4 kg) / 24.000 km = 4,17 Rp/km

- d). Brake seal : Rp. 16.000 / unit with 24.000 km so that (Rp. 16.000 x 1 unit) / 24.000 km = 0,67 Rp/km

- e). Brake shoes : Rp. 135.000 / unit with 24.000 km so that (Rp. 135.000 x 1 unit) / 24.000 km = 5,63 Rp/km

- f). Oil filter : Rp. 125.000 / unit with 24.000 km so that $(Rp. 125.000 \times 1 \text{ unit}) / 24.000 \text{ km} = 5,21 \text{ Rp/km}$
- g). Fuel filter : Rp. 125.000 / unit with 24.000 km so that $(Rp. 125.000 \times 1 \text{ unit}) / 24.000 \text{ km} = 6,46 \text{ Rp/km}$
- h). Air filter : Rp. 155.000 / unit with 24.000 km so that $(Rp. 155.000 \times 1 \text{ unit}) / 24.000 \text{ km} = 6,46 \text{ Rp/km}$
- i). Water cooler : Rp. 100.000 / unit with 24.000 km so that $(Rp. 100.000 \times 1 \text{ unit}) / 24.000 \text{ km} = 4,17 \text{ Rp/km}$
- j). Service cost : $15\% \times (6,33 + 6,67 + 4,17 + 0,67 + 5,63 + 5,21 + 5,21 + 6,46 + 4,17) = 6,68 \text{ Rp/km}$
- e. General checking
- a). Power steering oil : Rp. 90.000 / liter with 48.000 km so that $(Rp. 90.000 \times 3 \text{ liter}) / 48.000 \text{ km} = 5,63 \text{ Rp/km}$
- b). Hydraulic fluid : Rp. 85.000 / liter with 48.000 km so that $(Rp. 85.000 \times 3 \text{ liter}) / 48.000 \text{ km} = 5,31 \text{ Rp/km}$
- c). Clutch plat : Rp. 1.600.000 / unit with 48.000 km so that $Rp. 1.600.000 / 48.000 \text{ km} = 33,33 \text{ Rp/km}$
- d). Clutch drop : Rp. 2.400.000 / unit with 48.000 km so that $Rp. 2.400.000 / 48.000 \text{ km} = 50,00 \text{ Rp/km}$
- e). Accumulator : Rp. 850.000 / pcs with 48.000 km so that $Rp. 850.000 / 48.000 \text{ km} = 17,71 \text{ Rp/km}$
- f). Leaf spring : Rp. 850.000 / one set with 48.000 km so that $Rp. 850.000 / 48.000 \text{ km} = 17,71 \text{ Rp/km}$
- g). Wiper blade : Rp. 200.000 / one set with 48.000 km so that $Rp. 200.000 / 48.000 \text{ km} = 4,17 \text{ Rp/km}$
- h). Shock absorber : Rp. 500.000 / one set with 48.000 km so that $Rp. 500.000 / 48.000 \text{ km} = 10,42 \text{ Rp/km}$
- i). Rubber : Rp. 150.000 / one set with 48.000 km so that $Rp. 150.000 / 48.000 \text{ km} = 3,13 \text{ Rp/km}$
- j). Timing belt : Rp. 1.450.000 / one set with 48.000 km so that $Rp. 1.450.000 / 48.000 \text{ km} = 30,21 \text{ Rp/km}$
- k). Fan belt : Rp. 85.000 / one set with 48.000 km so that $Rp. 85.000 / 48.000 \text{ km} = 1,77 \text{ Rp/km}$
- l). Bearing : Rp. 220.000 / unit with 48.000 km so that $Rp. 220.000 / 48.000 \text{ km} = 4,58 \text{ Rp/km}$
- m). Bolamp : Rp. 75.000 / pcs with 48.000 km so that $(Rp. 75.000 \times 4 \text{ pcs}) / 48.000 \text{ km} = 6,25 \text{ Rp/km}$
- n). Fuse : Rp. 8.000 / pcs with 48.000 km so that $(Rp. 8.000 \times 2 \text{ pcs}) / 48.000 \text{ km} = 0,33 \text{ Rp/km}$
- f. Regular checking
- a). Machine oil : Rp. 45.000 / liter with 500 km so that $(Rp. 45.000 \times 0,25 \text{ liter}) / 500 \text{ km} = 22,50 \text{ Rp/km}$
- b). Accumulator water : Rp. 25.000 / liter with 500 km so that $(Rp. 25.000 \times 0,5 \text{ liter}) / 500 \text{ km} = 25,00 \text{ Rp/km}$
- c). Tire repair : Rp. 35.000 per pieces with 500 km so that $Rp. 35.000 / 500 \text{ km} = 70,00 \text{ Rp/km}$
- g. Repair body and container
- a). Material cost : Rp. 6.000.000 / pcs with 96.000 km so that $Rp. 6.000.000 / 96.000 \text{ km} = 62,50 \text{ Rp/km}$
- b). Service cost : $15\% \times (62,50) = 9,38 \text{ Rp/km}$
- h. Retribution
- a). Weighbridge : Rp. 25.000 with 500 km so that $Rp. 25.000 / 500 \text{ km} = 50,00 \text{ Rp/km}$
- b). Parking : Rp. 20.000 with 500 km so that $(Rp. 20.000 \times 3 \text{ kali}) / 500 \text{ km} = 120,00 \text{ Rp/km}$
- i. Truck washing
- Truck washing: Rp. 100.000 with 500 km so that $Rp. 100.000 / 500 \text{ km} = 200,00 \text{ Rp/km}$
- j. Crew income
- a). Driver salary : Rp. 1.600.000,00 /rit with unit of 96.000 km

$$\frac{Rp. 1.600.000 \times (8 \times 2) \times 12 \text{ months}}{96.000} = 3.200,00 \text{ Rp/km}$$
- b). Driver's helper salary : Rp. 450.000 /rit with unit of 96.000 km

$$\frac{Rp. 450.000 \times (8 \times 2) \times 12 \text{ months}}{96.000} = 1.100,00 \text{ Rp/km}$$
- k. Food on trip
- a). Driver : Rp. 100.000,00 /rit with unit of 96.000 km

$$\frac{(Rp. 100.000 \times 2) \times (8 \times 2) \times 12 \text{ months}}{96.000} = 400,00 \text{ Rp/km}$$
- b). Driver's helper : Rp. 50.000 /rit with unit of 96.000 km

$$\frac{(Rp. 50.000 \times 2) \times (8 \times 2) \times 12 \text{ months}}{96.000} = 200,00 \text{ Rp/km}$$

2. Indirect cost $\frac{Rp. 9.000.000,00}{96.000} = 93,75 Rp/km$
- 1). Fixed cost
- Salary of non-crew employee:
- a. Cashier : Rp. 3.000.000,00 with unit of 96.000 km

$$\frac{(Rp. 3.000.000 \times 12 \text{ months})}{96.000} = 375,00 Rp/km$$
- b. Accounting : Rp. 4.500.000,00 with unit of 96.000 km

$$\frac{(Rp. 4.500.000 \times 12 \text{ months})}{96.000} = 562,50 Rp/km$$
- c. Administration : Rp. 4.000.000,00 with unit of 96.000 km

$$\frac{(Rp. 4.000.000 \times 12 \text{ months})}{96.000} = 312,50 Rp/km$$
- 2). Variable Cost
- a. Depreciation
- a) Office building : calculated in amount of 20 %

$$\frac{(Rp. 1.500.000.000 - (20\% \times 1.500.000.000))}{20} = 60.000.000,00 Rp/year$$

$$\frac{Rp. 60.000.000,00}{96.000} = 625,00 Rp/km$$
- b). Garage building : calculated in amount of 20 %

$$\frac{(Rp. 520.000.000 - (20\% \times 520.000.000))}{20} = 20.800.000,00 Rp/year$$

$$\frac{Rp. 20.800.000,00}{96.000} = 216,67 Rp/km$$
- c). Office tools : calculated in amount of 20 %

$$\frac{(Rp. 74.000.000 - (20\% \times 74.000.000))}{20} = 2.960.000,00 Rp/year$$

$$\frac{Rp. 2.960.000,00}{96.000} = 30,83 Rp/km$$
- d). Garage facility : calculated in amount of 20 %

$$\frac{(Rp. 225.000.000 - (20\% \times 225.000.000))}{20} = 9.000.000,00 Rp/year$$
- b. Office administration cost : Rp. 27.000.000 with 96.000 km so that Rp. 27.000.000 / 96.000 km = 281,25 Rp/km
- c. Maintenance cost : Rp. 54.000.000 with 96.000 km so that Rp. 54.000.000 / 96.000 km = 562,50 Rp/km
- d. Electricity and water bill : Rp. 20.000.000 with 96.000 km so that Rp. 20.000.000 / 96.000 km = 208,33 Rp/km
- e. Communication cost : Rp. 15.000.000 with 96.000 km so that Rp. 15.000.000 / 96.000 km = 156,25 Rp/km
- f. Account cost: Rp. 2.000.000 with 96.000 km so that Rp. 2.000.000 / 96.000 km = 20,83 Rp/km
- g. Business permission fee : Rp. 15.000.000 with 96.000 km so that Rp. 15.000.000 / 96.000 km = 156,25 Rp/km
3. Over head
 Over head is calculated 10 % and multiple with the combination of direct and indirect cost:
 $10\% \times (\text{direct cost} + (\text{indirect cost} / \text{the number of transportation}))$
 $10\% \times (Rp. 7.772,95 + (Rp.3.789,17 / 5 \text{ bh})) = 853,08 Rp/km$
4. Production cost
 Is the total of direct and indirect component cost plus with overhead, so that:
 $Rp. 8.530,78 + Rp. 853,08 = 9.383,86 Rp/km$

V. DISCUSSION

5.1 Vehicle Operational Cost (VOC) of truck to carry goods/material

Based on the data, production cost is obtained and presented in table 5

Table 5. VOC Average

No.	Truck Type	Above limit	Under limit	Average Weight	VOC Average	
		(Rp/km)	(Rp/km)	(Ton)	(Rp/km)	(Rp/Ton.km)
1.	Expedition	9.824,60	9.034,94	9,81	9.429,77	961,00
2.	Freelance driver	8.448,37	7.669,33		8.058,85	821,28
Total					8.744,31	891,14

Based on Table 5, the average of VOC which obtained from both of truck types is 8.744,31 rupiah/km and 891,14 rupiah/ton/km.

5.2 Existing Fare Calculation

The list of existing fare calculation result can be seen in Table 6

Table 6. List of Existing Fare Calculation of Truck

No.	Police Number	Total distance (km)	Cost (Rp.)	Material weight (Ton)	Fare Rp/km	Fare Rp/ton.km
1	DA 1424 AL	1000	8.100.000,00	9,00	8.100,00	900,00
2	DA 1060 BG	1000	8.600.000,00	10,00	8.600,00	860,00
3	KH 9001 EF	1000	8.100.000,00	9,00	8.100,00	900,00
4	DA 1243 AM	1000	8.000.000,00	10,00	8.000,00	800,00
5	DA 1035 FD	1000	8.800.000,00	11,00	8.800,00	800,00
6	DA 1267 HB	1000	8.500.000,00	10,00	8.500,00	850,00
7	DA 8286 EF	1000	9.000.000,00	10,00	9.000,00	900,00
8	DA 1998 FD	1000	8.800.000,00	11,00	8.800,00	800,00
9	DA 1939 AK	1000	8.400.000,00	10,00	8.400,00	840,00
10	DA 9759 FE	1000	8.100.000,00	9,00	8.100,00	900,00
11	DA 1046 EF	1000	8.100.000,00	9,00	8.100,00	900,00
12	DA 1989 FE	1000	8.500.000,00	10,00	8.500,00	850,00
13	KH 9750 E	1000	8.550.000,00	9,00	8.550,00	950,00
14	DA 9145 WL	1000	8.100.000,00	9,00	8.100,00	900,00
15	DA 8607 FE	1000	8.400.000,00	10,00	8.400,00	840,00
16	DA 8250 MM	1000	8.100.000,00	9,00	8.100,00	900,00
17	L 9704 VU	1000	8.500.000,00	10,00	8.500,00	850,00
18	DA 9430 AQ	1000	8.100.000,00	9,00	8.100,00	900,00
19	DA 8724 CF	1000	9.350.000,00	11,00	9.350,00	850,00
20	DA 9431 TW	1000	9.000.000,00	10,00	9.000,00	900,00
21	KH 8030 ET	1000	8.100.000,00	9,00	8.100,00	900,00
22	DA 1060 FD	1000	8.500.000,00	10,00	8.500,00	850,00
23	DA 1084 BG	1000	10.000.000,00	10,00	10.000,00	1000,00
24	KH 8241 EP	1000	10.000.000,00	10,00	10.000,00	1000,00
25	R 1954 CD	1000	10.000.000,00	10,00	10.000,00	1000,00
26	AB 8490 ME	1000	9.000.000,00	9,00	9.000,00	1000,00
27	DA 1888 ED	1000	10.000.000,00	10,00	10.000,00	1000,00
28	DA 9727 CF	1000	10.450.000,00	11,00	10.450,00	950,00
29	AD 1971 F	1000	9.500.000,00	10,00	9.500,00	950,00
30	DA 1119 FD	1000	9.500.000,00	10,00	9.500,00	950,00
31	DA 1507 HB	1000	9.500.000,00	10,00	9.500,00	950,00
32	DA 1058 FD	1000	9.500.000,00	10,00	9.500,00	950,00
Average				9,81	8.848,44	902,81
Maximum				11,00	10.450,00	1.000,00
Minimum				9,00	8.100,00	840,00

Recent fare is obtained from freelance driver truck and expedition truck calculation. In order to obtain recent fare from all of the respondents (32 samples), thus:

- Average fare Rp./km $= \frac{\text{Rp.283.150,00}}{32} = \text{Rp.8.848,44} /\text{km}$
- Average fare Rp./ton/km $= \frac{\text{Rp.28.890,00}}{32}$

$$= \text{Rp.902,81} /\text{ton.km}$$

Therefore if it is seen from table 5 and table 6, we can conclude that the calculation of existing fare average is a little bit higher than VOC calculation for fare Rp./km and Rp./ton.km.

5.3 Calculation of Material Basic Price in Destination Region

Table 7. Summary of Transportation Cost and Destination Region Basic Price

NO.	JENIS BAHAN BANGUNAN	KAPASITAS ANGKUTAN TRUK RATA-RATA	ANGKUTAN BESI					
			Kapasitas Angkut	Berat Material Besi	Jumlah Besi	Pembulatan	Harga Material per batang di Banjarmasin	Total Harga Pembelian di Banjarmasin
	(Material)	TON	(Ton)	kg	(Btg)	(Btg)	(Rp.)	(Rp.)
1	Besi Ø10mm+Semen	9,81	7,81	7,40	1054,84	1055,00	Rp 78.000,00	Rp 82.290.000,00

Continuation of Table 7

NO.	BUILDING MATERIAL TYPES	AVERAGE CAPACITY OF TRUCK	CEMENT TRANSPORT				
			Capacity	Cement Material Weight	Number of sack	Material/bar price in Banjarmasin	Total purchase price in Banjarmasin
	(Material)	TON	(Ton)	kg	(Sack)	(Rp.)	(Rp.)
1	Iron Ø10mm+Cement	9,81	2,00	50,00	40	Rp 50.000,00	Rp2.000.000,00

Continuation of Table 7

No.	BUILDING MATERIAL TYPES	BBM SOLAR INCREASE (GAS STATION)	TRANSPORATION FARE BASED ON VOC	
			(Rp./Km)	(Rp./Km.ton)
	(Material)	(Rp.)	(Rp./Km)	(Rp./Km.ton)
1	Iron Ø10mm+Cement	Rp -	8.744,31	891,14
		Rp 500,00	8.834,01	900,28
		Rp 1.000,00	8.923,71	909,42
		Rp 1.500,00	9.013,42	918,56
		Rp 2.000,00	9.103,12	927,71
		Rp 4.000,00	9.461,93	964,27
		Rp 6.000,00	9.820,74	1.000,84

Continuation of Table 7

TRANSPORT FARE			TOTAL MATERIAL PURCHASE + TRANSPORT FARE	
Iron	Cement	Total of Transport Fare	Iron	Cement
(Rp.)	(Rp.)	(Rp.)	(Rp.)	(Rp.)
Rp 3.479.901,70	Rp 891.140,00	Rp 4.371.041,70	Rp 85.769.901,70	Rp 2.891.140,00
Rp 3.515.598,62	Rp 900.281,34	Rp 4.415.879,96	Rp 85.805.598,62	Rp 2.900.281,34
Rp 3.551.296,74	Rp 909.422,98	Rp 4.460.719,72	Rp 85.841.296,74	Rp 2.909.422,98
Rp 3.586.994,86	Rp 918.564,63	Rp 4.505.559,49	Rp 85.876.994,86	Rp 2.918.564,63
Rp 3.622.692,98	Rp 927.706,27	Rp 4.550.399,25	Rp 85.912.692,98	Rp 2.927.706,27
Rp 3.765.485,46	Rp 964.272,85	Rp 4.729.758,30	Rp 86.055.485,46	Rp 2.964.272,85
Rp 3.908.277,94	Rp 1.000.839,42	Rp 4.909.117,36	Rp 86.198.277,94	Rp 3.000.839,42

Continuation of table 7

MATERIAL BASIC PRICE IN DESTINATION REGION			
Iron / Bar			
(Rp.)	Integration (Rp.)	Increase (Rp.)	(%)
Rp 81.298,49	Rp 81.300,00	Rp 3.298,49	4,06%
Rp 81.332,32	Rp 81.400,00	Rp 3.332,32	4,09%
Rp 81.366,16	Rp 81.400,00	Rp 3.366,16	4,14%
Rp 81.400,00	Rp 81.400,00	Rp 3.400,00	4,18%
Rp 81.433,83	Rp 81.500,00	Rp 3.433,83	4,21%
Rp 81.569,18	Rp 81.600,00	Rp 3.569,18	4,37%
Rp 81.704,53	Rp 81.800,00	Rp 3.704,53	4,53%

Continuation of table 7

MATERIAL BASIC PRICE IN DESTINATION REGION			
Cement / Sack			
(Rp.)	Integration (Rp.)	Increase (Rp.)	(%)
Rp 72.278,50	Rp73.000,00	Rp22.278,50	30,52%
Rp 72.507,03	Rp73.000,00	Rp22.507,03	30,83%
Rp 72.735,57	Rp73.000,00	Rp22.735,57	31,14%
Rp 72.964,12	Rp73.000,00	Rp22.964,12	31,46%
Rp 73.192,66	Rp74.000,00	Rp23.192,66	31,34%
Rp 74.106,82	Rp75.000,00	Rp24.106,82	32,14%
Rp 75.020,99	Rp76.000,00	Rp25.020,99	32,92%

Based on table 7 by taking calculation of reinforcement iron material Ø10mm as an example, it is known that the basic price of reinforcement iron Ø10mm per bar in the destination region is Rp. 81.298,4 and its purchase price in Banjarmasin is Rp. 78.000,00. Thus there are price differences in amount of Rp. 3.298,49. The increasing percentage is caused by material transportation cost in amount of 4,06%.

For cement Gresik, its basic price in the destination area per sack is Rp. 72.278,50 and the purchase price in Banjarmasin is Rp. 50.000,00. Hence, there are price differences in amount of Rp. 22.278,50 and the increasing percentage is caused by transportation cost in amount of 30,52%.

5.4 The Influence of Operational Cost on Building Material

The influence of building material transportation VOC in route of Banjarmasin – Puruk Cahu upon the basic price in the destination area particularly for reinforcement iron material and Portland cement are represented in Figure 1 and 2 with correlation graphic for both of the factors.

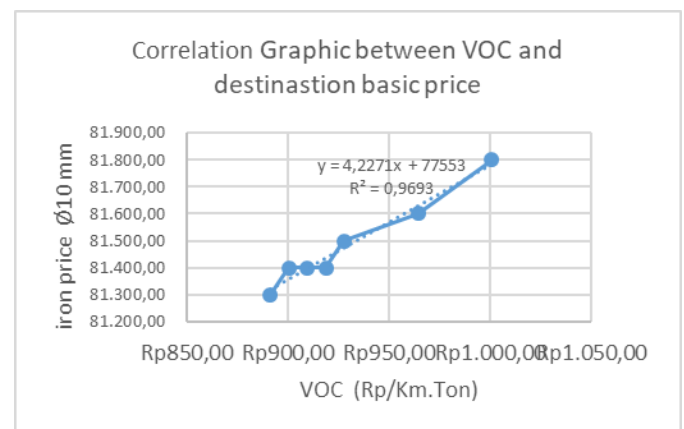


Fig.1: Correlation graphic between VOC and destination basic price of iron Ø10mm

Based on figure 1, it can be concluded that the influence of reinforcement iron price increase due to transportation cost is 96,93% and the rest of 3,07% is caused by another factor. Therefore, the equation correlation of those two factors is:

$$y = 4,2271x + 77553$$

Where:

y = Material iron price per bar (Rp.)

x = Vehicle operational cost (Rp./km.ton)

With R² value = 0,9693

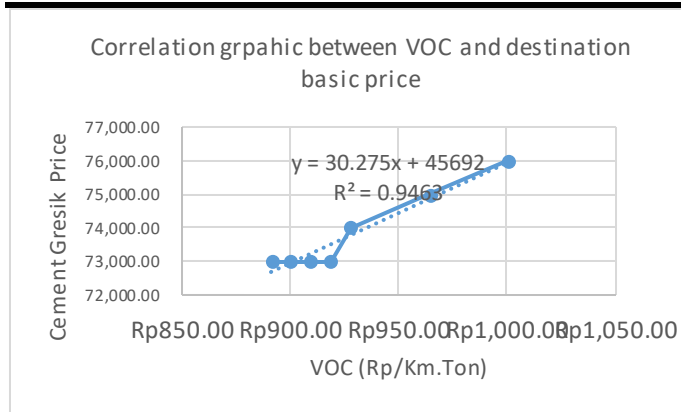


Fig.2: Correlation graphic of VOC and cement basic price in destination area

Based on the figure of 5.2, it can be concluded that the influence of portland cement price increase due to transportation cost is 94,63% and the rest of 5,37% is caused by another factor. Therefore, the correlation equation of those two factors is:

$$y = 30,275x + 45692$$

Where:

y = portland cement price per 50 kg (Rp./sak)

x = vehicle operational cost (Rp./km.ton)

with R^2 value = 0,9463

VI. CONCLUSION

According to the analysis and discussion in previous chapter, it can be concluded that:

1. Vehicle Operational Cost (VOC) Banjarmasin – Puruk Cahu route for building material transport especially reinforcement iron and cement are Rp. 8.744,31 /km and Rp. 891,14 /ton.km.
2. Building material transportation fare based on existing fare calculation from sample profil obtains minimum material transport fare in amount of Rp. 8.100,00 /km and Rp. 840,00 /ton.km with minimum capacity 9 ton, maximum fare transport in amount of Rp. 10.450,00 /km and Rp. 1000,00 /ton.km with maximum capacity 11 ton. The average material transport fare are Rp.8.848,44 /km and Rp. 902,81 /ton.km with average load in amount of 9,81 ton. In consequences, it is known that the average existing fare transportation is a little bit higher than the calculation of VOC for fare Rp./km and Rp./ton.km.
3. The influence of VOC increase for reinforcement iron material is 96,93% and portland cement is 94,63%. The rest 3,07% of reinforcement material and 5,37% of portland cement are caused by another factor.

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