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ANALYSIS OF FARES AND SUBSIDY NEEDS FOR PUBLIC TRANSPORTATION USING THE VEHICLE OPERATING COST APPROACH (CASE STUDY: CORRIDOR 2 TRANS CIREBON)

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ABSTRACT

Public transportation subsidies or what is called the Public Service Obligation (PSO) is an important indicator in the public transport system to ensure the sustainability of the operation of the public transportation system. Subsidies are government interventions in controlling transportation fares so that people can use public transportation at affordable fares. This study aims to provide an overview of the determination of fares and the amount of subsidy needed in corridor 2 of Trans Cirebon. Fare analysis is determined using the vehicle operating cost and Willingness To Pay (WTP) approaches which will then form the basis for providing an overview of the subsidy that should be provided by the Government in an ideal Trans Cirebon operation. This research shows that: 1) the fare currently applied are still in accordance with the WTP value the people of Cirebon City; 2) for an ideal Trans Cirebon operation, a vehicle operating cost of Rp. 6,135,159,933.29/year is required; 3) the amount of subsidy required ranges from Rp. 5,705,919,933.29/year to Rp. 6,108,879,933.29/year depending on the achievement value of the load factor and the fare applied.

Keyword: *Vehicle Operating Costs (VOC), Willingness to Pay (WTP), Trans Cirebon, Public Transport Fares, Public Transport Subsidies*

1. INTRODUCTION

Public transportation is known as a vehicle that functions as a means of public transportation in the form of buses, trains, and so on [1], with the designation of Cirebon City as one of the metropolitan areas according to Government Regulation No. 26 of 2008 in the Ciayumajakuning area (City and Regency of Cirebon, Indramayu, Majalengka and Kuningan), this can increase the growth in the number of private vehicles. According to [2] motorbike users in the Cirebon City area reach more than 3% per year and private car vehicles reach 7% per year. With the existing developments, there is a need for transportation services to support the needs of people's movement and transportation trips in the city of Cirebon. Mass transit is one of the strategies to reduce congestion, but in determining the route, it must have a special route so that the route does not overlap with the previous paratransit and other feeder line routes [3].

The problem that often occurs in the implementation of public transportation is the lack of ridership rates so that revenue from fares is unable to cover the vehicle operating costs that must be incurred. To resolve the problem, the Government provides subsidies called Public Service Obligation (PSO) to ensure the continuity of public transport operations. The provision of subsidies is carried out as government intervention so that people are able to use public transportation at affordable rates. The amount of subsidies that must be issued by the government is influenced by the amount of VOC that must be issued and income derived from tariffs and non-tariffs, where the subsidy is the difference

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between VOC and the income. As explained in [4] that subsidies are funds for operating costs of public transportation with economy-class fares on certain routes that are not financially profitable, including urban routes with mass transit. Because this provision will have a major effect on transportation performance, as explained [5] the impact of the lack of subsidies from the government will affect the performance of public transportation, in which the impact is that people will return to using private transportation.

In order to improve the performance of the Trans Cirebon, the Government has developed a corridor 2 route where the route passes through areas with high activity intensity in the hope that it will increase the Trans Cirebon rideship so that revenue from tariffs can increase. However, even though the ridership rate increases, the facilities and infrastructure in the implementation of public transportation cannot be separated from the provision of subsidies from the government, especially to be able to support ideal operations according to standards. Therefore this study aims to provide an overview in analyzing fare based on two aspects, namely the value of Vehicle Operating Costs (VOC) and the results of the Willinengs To Pay (WTP) survey, then determine the amount of subsidy needed in Trans Cirebon corridor 2 operations ideally.

2. LITERATURE REVIEW

Fares are a basic component in the operation of public transportation [6]. In considering tariff policies, of course, there are various transit services that need to be developed and implemented, such as quality demand [7] relations from other policies, such as service technology from competitors, and tariff cards [8], transportation costs [9], and operational needs [10] which must be focused on together with the fare [11].

Fares can be determined based on the Ability To Pay (ATP) and Willingness To Pay (WTP) of users [6]. The method of determining the value of ATP can use the travel cost method which assumes that travel requests to certain locations depend on travel costs, income, location characteristics, replacement prices, and others [12]. WTP value can also be determined using several approaches, for example through questionnaires, discrete choice analysis to predict options in the market given by discrete choice theory [13], [14].

Of course, in addition to fares that can help business continuity, an important thing that must not be forgotten is the role of the Cirebon City Government in maximizing the provision of subsidies or Public Service Obligations (PSO) to Trans Cirebon. PSO is in the form of a subsidy which is useful for reducing losses on the large cost component borne by operators in operating public transportation [15], given that capital/subsidies are important in operating the public transport system efficiently and effectively to obtain sustainable development [16]. This factor is what makes the performance of corridor 1 less than optimal, because in providing subsidies regarding facilities and infrastructure it is not optimal. In organizing public transportation in big cities and small towns subsidies are very much needed to cover vehicle operating costs (VOC) [17].

3. METHODOLOGY

3.1. Research Metode

Figure 1. is a flowchart of study activities that begins with data collection in which a survey plan is drawn up to obtain primary data in the form of questionnaires and secondary data originating from insights related to this research.
This data was obtained through a survey by means of direct observation in the field. The primary survey that needs to be carried out is a questionnaire survey using the stated preference method with the aim of obtaining data on the characteristics of people's movements and data on the willingness to pay of the Cirebon city community regarding BRT Trans Cirebon, while secondary data is obtained by visiting the relevant agencies to request a number of data documentation from the managing institution transportation systems, spatial planners and a number of other agencies that can provide data relating to the implementation of the study.

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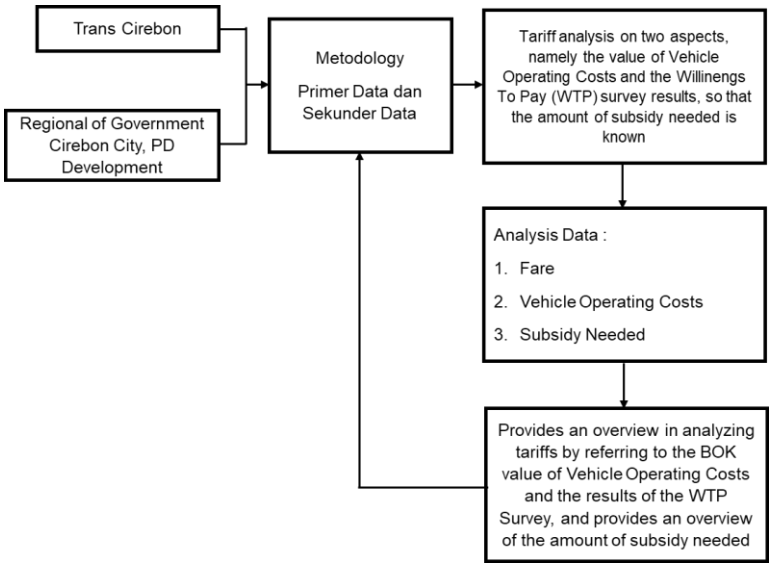

Figure 1. Research Methodology

3.2. Research Loacation

This research was carried out in corridor 2 which has a total of 28 km, as illustrated in **Figure 2**, with the following route : Terminal Harjamukti (Kel. Kecapi) – jl. Jend. A.Yani (kel. kecapi) – jl. Kanggraksan (Kel. Harjamukti) - jl. Jend. Sudirman (Kel. Harjamukti) – jl Angkasa Raya (Kel. Kalijaga) – jl. Katiasa (Kel. Kecapi) – jl. Pramuka (Kel. Kalijaga) – U turn jl. Pramuka (Cadas ngampar/Argasunya) - jl. Angkasa – jl. Angkasa Raya – jl. Jend. Sudirman – jl. Kalitanjung – jl. Evakuasi (Kel. Sunyaragi) – jl. Brigjen Dharsono (By.Pass) (Kel. Sunyaragi) – jl. Pemuda (Kel. Sunyaragi) – jl. DR. Cipto MK (Kel. Pekiringan) – jl. Tentara Pelajar (Kel. Pekiringan) – jl. Sukalila Selatan (Kel. Pekalangan) – jl. Siliwangi (Kel. Kesenden) – jl. Veteran (Kel. Kejaksan)– jl. Sisingamangaraja (kel. Panjunan) – jl. Benteng (kel. Panjunan) – jl. Merdeka (Kel. Lemawungkuk) – jl. Pulasaren (Kel. Pulasaren) – jl. Kutagara (Kel. Pulasaren) – jl. Pangeran Drajat (Kel.drajat) – jl. Rajawali Raya (Kel.larangan) – jl. Jend.A. yani (T. Harjamukti).

Image 2. Research Location

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4. RESULT AND DISCUSSION

4.1. Vehicle Operation Cost (VOC) Analysis

In determining VOC, it is necessary to match the amount of tariffs (receipt) so that in the future operators can receive reasonable profits and can guarantee the continuity and development of the business services they manage. For determining VOC, there are several components of vehicle operating costs as shown in **Table 1**, and those components, as follows :

a. Fixed Cost
   a.) Productive vehicle depreciation
   b.) Productive vehicle capital interest
   c.) Bus crew (driver and conductor)
   d.) Fuel Oil (BBM)
   e.) Tire
   f.) Small Services
   g.) Great Service
   h.) Inspection (Overhaul)
   i.) Oil Addition
   j.) Parts and body
   k.) Bus wash
   l.) Terminal Levy
   m.) STNK/vehicle tax
   n.) Kir
   o.) Insurance

b. Variable Cost
   a.) Employee costs other than vehicle crew
      - salary/wages
      - overtime pay
      - social benefits
   b.) Management Fee
      - Office building depreciation
      - Shrinkage pool and workshop
      - Depreciation of inventory / office supplies
      - Depreciation of workshop facilities
      - Office administrative costs
      - Office maintenance costs
      - Pool and workshop maintenance costs
      - Electricity and water costs
      - Telephone and telegram expenses
      - Business travel expenses other than vehicle crew
      - Corporate tax
      - Route permit
      - Business permit
      - Marketing costs
      - Etc
   c.) Overhead

Based on Presidential Regulation no. 54 article 66 states that the overhead cost that is considered reasonable for service providers is 10% to 15%. However, in determining overhead costs, of course, it depends on the conditions and requirements that exist for each provider. In this study, overhead costs are taken at 10%.

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Table 1. Trans cirebon vehicle operation cost

A. VEHICLE CHARACTERISTICS			
1	Type	Medium Bus	
2	Kind of service	AC	
3	Capacity	40	
4	Load Factor	70%	
B. PRODUCTION OF ONE BUS			
1	Route length	28	
2	Km-miles / trips	28	
3	Km-miles / day	168	
4	Frequency / day	6	
5	Frequency / month	180	
6	Seat-km / rit	28	
7	Seat-km / day	168	
8	Seats - km / year	60.480	
9	Operating days / month	30	
10	Operating days / year	360	
11	Miles / month	5.040	
12	km-mile / year	60.480	
C. COST OF PRODUCTION			
1	Fixed cost	Bus/km	seat/km (LF = 70%)
	a. shrinkage	-	-
	b. Office fee per set	-	-
	c. Vehicle Crew Fees	Rp1.320,17	Rp47,15
	d. fuel costs	Rp1.360,00	Rp48,57
	e. Tire Fee	Rp375,00	Rp13,39
	f. Vehicle Maintenance Costs	Rp1.113,76	Rp39,78
	g. Terminal Fee	-	-
	h. PKB fee (STNK)	-	-
	i. KIR	Rp4,96	Rp0,18
	j. Insurance	-	-
	k. CCTV Bus	Rp297,62	Rp10,63
	l. BusGPS	Rp198,41	Rp7,09
	j. Complete Bus Interior Accessories	-	-
	j. Corporate Tax	Rp164,38	Rp5,87
	Total Fixed Costs	**Rp4.834,31**	
2	Variable	-	-
	a. Employee Costs	Rp2.612,14	Rp93,29
	b. Cost management	Rp390,49	Rp13,95
	c. Additional Facilities	Rp546,63	Rp19,52
	Total Variable Cost	**Rp3.549,26**	
3	Overhead		
	(Fixed + Variable)*10%	**Rp838,36**	Rp29,94
	Total VOC + Profit (10%)	**Rp10.144,11**	**Rp362,29**

The results of the analysis in **Table 1** above explain the calculation of the cost of production for the operation of 1 (one) Trans Cirebon bus unit in 1 (one) itinerary or rit. Based on the calculation results, the total cost of production is Rp.10,144.11/bus.km or Rp.362.29/seat.km for a load factor of 70%. The

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results of the calculation of the cost of production become the basis for calculating the operating costs of the vehicles needed in 1 (one) year for 1 (one) fleet and 10 (ten) Trans Cirebon Bus fleets.

Table 2. Corridor 2 trans cirebon vehicle operating costs

coridor	Component VOC (Rp/Km)			VOC (IDR/Km)	Amount (Trip/Day)	Length (Km/Trip)	Amount (Km/Day)	Component VOC (Rp/Km)			VOC (Rp/Day)
	Fixed cost	*Variable Cost*	*Overhead*					*Fixed cost*	*Variable Cost*	*Overhead*	
coridor 2	Rp 4.834,31	Rp 3.549,26	Rp 838,36	Rp 10.144,11	6	28	168	Rp 812.164,00	Rp 596.274,91	Rp 140.843,89	Rp 1.704.211,09

Based on the calculations in **Table 2.**, the vehicle operating costs in Rp/km above are obtained at 10,144 Rp/km, which is then calculated for the total vehicle operating costs for corridor 2 reviewed in Rp/day. Based on VOC analysis, it was found that the value of VOC for corridor 2 using all 10 fleets was Rp. 17,040,950/day or Rp. 6,134,746,464/year.

4.2. Determination Fare Analysis

In this study to find out the amount of fares based on the Vechicle Operation Cost (VOC) refers to [18], and in **Table 3** a load factor scenario of 10% - 70% is made so that the amount of fares that must be applied for each scenario can be determined.

Table 3. Fare determination based on VOC and Load Factor Scenario

Load factor	Fares
70%	Rp. 10.144
60%	RP. 11.835
50%	RP. 14.202
40%	RP. 17.752
30%	RP. 23.670
20%	RP. 35.505
10%	RP. 71.009

For fare determination based on the willingness to pay (WTP) value obtained from the results of the questionnaire with a total of 368 respondents, and from the results of the questionnaire that the desired rate is Rp. 3000 – Rp. 5000. The results of this acquisition can be seen in **Figure 3** that the fare currently applied is still in accordance with the willingness of the community to pay, with the application of a student rate of Rp. 3000 and for the general rate of Rp. 5000 is still applicable.

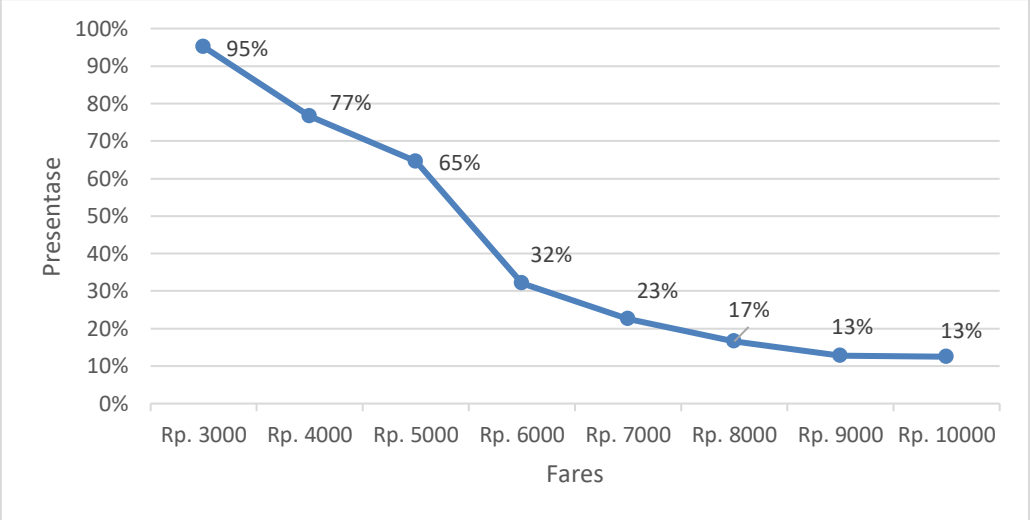

Figure 3. The results of the desired rate of respondents based on WTP Value

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4.3. Subsidy Needs Analysis

As previously explained, subsidies in public transportation are very important, where these grants will have an impact on the operational of public transportation. In calculating the needs for subsidy funds provided, it can be obtained from the difference in total revenue with the total operating costs of the required fleet. In this study calculate the amount of subsidy needs for Trans Cirebon based on several load factor and fare scenario.

Table 4. Trans Cirebon Subsidy Needs per Year Based on Several Load Factor and Fare Scenario

Fares	*Load factor*	Total Passenger	Revenue	VOC/Years	Subsidy
Rp. 3000	70%	28	Rp. 183.960.000	Rp.6.135.159.933,29	Rp5.951.199.933,29
	60%	24	Rp. 157.680.000		Rp5.977.479.933,29
	50%	20	Rp. 131.400.000		Rp6.003.759.933,29
	40%	16	Rp. 105.120.000		Rp6.030.039.933,29
	30%	12	Rp. 78.840.000		Rp6.056.319.933,29
	20%	8	Rp. 52.560.000		Rp6.082.599.933,29
	10%	4	Rp. 26.280.000		Rp6.108.879.933,29
Rp. 4000	70%	28	Rp. 245.280.000		Rp5.889.879.933,29
	60%	24	Rp. 210.240.000		Rp5.924.919.933,29
	50%	20	Rp. 175.200.000		Rp5.959.959.933,29
	40%	16	Rp. 140.160.000		Rp5.994.999.933,29
	30%	12	Rp. 105.120.000		Rp6.030.039.933,29
	20%	8	Rp. 70.080.000		Rp6.065.079.933,29
	10%	4	Rp. 35.040.000		Rp6.100.119.933,29
Rp. 5000	70%	28	Rp. 306.600.000		Rp5.828.559.933,29
	60%	24	Rp. 262.800.000		Rp5.872.359.933,29
	50%	20	Rp. 219.000.000		Rp5.916.159.933,29
	40%	16	Rp. 175.200.000		Rp5.959.959.933,29
	30%	12	Rp. 131.400.000		Rp6.003.759.933,29
	20%	8	Rp. 87.600.000		Rp6.047.559.933,29
	10%	4	Rp. 43.800.000		Rp6.091.359.933,29
Rp, 6000	70%	28	Rp. 367.920.000		Rp5.767.239.933,29
	60%	24	Rp. 315.360.000		Rp5.819.799.933,29
	50%	20	Rp. 262.800.000		Rp5.872.359.933,29
	40%	16	Rp. 210.240.000		Rp5.924.919.933,29
	30%	12	Rp. 157.680.000		Rp5.977.479.933,29
	20%	8	Rp. 105.120.000		Rp6.030.039.933,29
	10%	4	Rp. 52.560.000		Rp6.082.599.933,29
Rp. 7000	70%	28	Rp. 429.240.000		Rp5.705.919.933,29
	60%	24	Rp. 367.920.000		Rp5.767.239.933,29
	50%	20	Rp. 306.600.000		Rp5.828.559.933,29
	40%	16	Rp. 245.280.000		Rp5.889.879.933,29
	30%	12	Rp. 183.960.000		Rp5.951.199.933,29
	20%	8	Rp. 122.640.000		Rp6.012.519.933,29
	10%	4	Rp. 61.320.000		Rp6.073.839.933,29

In the results obtained from Table 4 above regarding the amount of subsidy that must be given by the government in supporting the performance of Mass Transportation (Trans Cirebon) that the amount of subsidy needed ranges from IDR 5,705,919,933.29/year to IDR 6,108,879,933.29/year depending on the achievement value of the load factor and fare applied.

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5. CONCLUSION

Based on the results of the analysis obtained, the value of Vehicle Operation Cost in corridor 2 of Trans Cirebon is Rp. 17,040,950/day or Rp. 6,134,746,464/year (including operator profit of 10%) by using the entire fleet of 10 fleets. %). Based on this, the fare based on the BOK ranges from Rp. 10,144 to Rp. 71,009 depending on the load factor achievement value. Meanwhile, based on the willingness to pay survey, the fare can be determined between Rp. 3000 – Rp. 5000.
In providing subsidies from the Government of Cirebon to Corridor 2 Trans Cirebon, the amount of subsidy required ranges from Rp. 5,705,506,464 up to Rp. 6,108,466,464 per year depending on the achievement value of the load factor and the fare applied.

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