The International Journal of Social Sciences World
TIJOSSW is Available Online at:
https://www.growingscholar.org/journal/index.php/TIJOSSW
Vol. 7 No. 1, January- June 2025, Pages: 367~383
DOI: https://doi.org/10.5281/zenodo.16067343
ISSN 2690-5167
Growingscholar Publisher

An Analytical Study on the Operational Costs of Freight Truck Transportation in Papua Province

Arung Lamba[1], Marshal Arung Lamba[2], Manggalawati Tande Bura[3]

Article history:
Received: April 01, 2025; Accepted: May 21, 2025; Displayed Online: June 30, 2025; Published: June 30, 2025

Keywords

Cost;

Break-Even Point;

Return on Investment;

Operational Cost;

Papua;

Abstract

The current study defines transportation as the activity of relocating, moving, carrying, or transferring objects from one location to another using various transportation modes. The objectives of the study include: (1) calculating the operational costs of freight trucks (BOTKT) on the Abepura –Sentani route, (2) determining the ideal tariff per sack of rice using the operational cost method, (3) assessing the Return on Investment (ROI), and (4) identifying the shipment number at which the company reaches the Break-Even Point (BEP). The study seeks to enhance understanding of operational efficiency and profitability in the freight transport business. The analysis employs an operational cost approach to identify significant cost components and collect the necessary data for BEP and ROI calculations. The findings aim to support better business decision-making and strategic cost management to optimize profit planning. The key findings include: (1) The total annual operational cost (BOK) for a Gran Max Pick-Up truck was IDR 231,896,353, with a BEP at 8,556 rice sacks and an ROI of -90%. (2) For a Canter FE 71 truck, the annual BOK was IDR 670,051,366, with a BEP at 26,802 rice sacks and an ROI of -92%.

1. Introduction

As a result of technological advancements, transportation in Papua Province—especially in Jayapura City and Regency—has experienced rapid growth. This development coincides with the rising needs and living standards of the population, driven by the increasing demand for the movement of people and goods. As a result, there is growing pressure to provide adequate transportation infrastructure to support economic activities that are safe, efficient, comfortable, and cost-effective in terms of both time and expense.

In the field of freight transportation, growth is not only fueled by technology and rising social needs, but also by the increasing number of business actors and the expanding regional economy in both Jayapura City and Regency. It is undeniable that transportation plays a critical role in facilitating trade between regions as well as within urban areas. The transportation process supports inbound and outbound logistics, enabling the distribution of goods and services from

[1] *Universitas Cenderawasih, Jayapura, Indonesia, Email: arunglamba06@gmail.com*
[2] *Universitas Cenderawasih, Jayapura, Indonesia, Email: marsal.arunglamba@gmail.com*
[3] *Universitas Cenderawasih, Jayapura, Indonesia, Email: buramona@gmail.com*

producers to consumers. An effective distribution system ensures product availability anytime and anywhere, which creates significant opportunity costs—representing the competitive potential in the transport services sector.

In freight truck operations, operational costs are a crucial determinant of business success and sustainability. Analyzing truck operational costs helps truck owners or logistics companies to understand and manage the various expenses involved in daily operations. By gaining a comprehensive understanding of these cost components, companies can improve their planning, implement cost control measures effectively, and make informed decisions to enhance operational efficiency and business profitability.

The objectives of this study are fourfold. First, it aims to calculate the operational costs (*Biaya Operasional Kendaraan* or BOK) of freight transportation vehicles operating in Jayapura City and Jayapura Regency. Second, it seeks to determine the ideal tariff per sack of rice by applying the vehicle operational cost (BOK) calculation method. Third, the study intends to assess the Return on Investment (ROI) to evaluate the financial feasibility and profitability of freight transport operations. Lastly, it aims to identify the shipment count at which the business reaches a break-even point, providing insight into the minimum volume required for sustainable operations.

2. Theoretical Review

2.1 Basic Concept of Transportation

According to Nasution (2006), transportation is defined as the movement of goods and people from one place of origin to a destination, where the activity is concluded. Soesilo (2019) further explains that transportation refers to the movement behavior of individuals within a space, either moving themselves or transporting goods. There is a close interrelationship between economic activities and transportation, where both elements influence each other. As noted by Tamin (2017), economic growth is closely tied to transportation, as increased economic activity leads to higher public mobility, resulting in demand that often exceeds the capacity of existing transportation infrastructure. Thus, transportation and economic development are deeply interconnected. On one hand, transportation can stimulate regional economic growth; infrastructure development enables areas to enhance their economic potential. On the other hand, rapid economic growth can also cause transportation problems such as traffic congestion, which necessitates the expansion of transport infrastructure to accommodate increased activity.

Tamin (2017) outlines two main functions of transportation infrastructure, (1) as a supporting tool to drive regional development. (2) as an essential facility for the movement of people and goods. The first function is often utilized by regional planners to support the development of new areas. For example, a newly planned region may lack potential investment or population interest if it is not supported by accessible transport infrastructure. In such cases, transportation infrastructure becomes vital for accessibility, and its presence can significantly boost public interest and stimulate economic activity.

2.2 Theory of Vehicle Operational Costs (VOC)

According to Mulyadi (2015), cost is determined as the sacrifice of economic resources measured in monetary units, either already incurred or anticipated, to achieve a specific objective. In a business context, cost refers to the total expenditures made by a company to produce a product or deliver a service. These expenses include inventory, raw materials, labor , production, equipment, and operational expenses.

The calculation of Vehicle Operational Costs (VOC) is based on the Decree of the Directorate General of Land Transportation of the Republic of Indonesia (SK.687/AJ.206/DJRD/2002), which details the components of VOC comprehensively and reflects field conditions accurately.

2.2.1 Calculating Variable Costs & Calculating Fixed Costs

Variable costs are expenses that fluctuate depending on the volume of production or sales. The greater the production or sales volume, the higher the variable costs incurred. Fixed costs are expenses that remain constant regardless of changes in production levels or sales volume. These costs do not fluctuate with operational activity and must be borne by the company even when output is minimal. In the context of freight transportation and logistics, fixed costs typically include vehicle depreciation, vehicle taxes, and fees for KIR (roadworthiness) inspections, which are conducted twice a year. Additionally, salaries for drivers, helpers, and warehouse employees are categorized as fixed costs, as are expenditures for warehouse rent and electricity. These fixed components form the baseline of operational expenses that must be managed efficiently to maintain financial stability.

2.2.2 Calculating Total Vehicle Operational Costs

The method for calculating total VOC is by summing both the fixed and variable costs, calculated annually and daily. This yields the total annual VOC and daily VOC, as outlined below:
Total Annual VOC = Annual Fixed Costs + Annual Variable Costs
Daily VOC = Total Annual VOC / Number of Operational Days

VOC/Year
= Annual Fixed Costs + Annual Variable Costs .....(2.1)
VOC/Month
= VOC/Year ÷ 12 .....(2.2)
VOC/Day
= VOC/Month ÷ *number of days in a month* .....(2.3)

Mulyati and Aghitsna Iqbal Alif (2018)

2.2.3 Tariff and Break-Even Point Analysis in Freight Transportation

Basic Tariff Determination

The basic tariff, also referred to as the base rate, is the minimum price required to provide a transportation service. It represents the lowest amount a company must charge to cover operational costs and avoid losses, without necessarily generating profit. In the freight forwarding industry, each company typically determines its own base tariff based on operational parameters. The formula for calculating the base tariff is as follows: Base Tariff = (Daily Operating Cost (DOC) / Vehicle Capacity) × Distance Travelled (2.4)
(Mulyati & Aghitsna Iqbal Alif, 2018)

Determining the Ideal Tariff

According to Mulyati and Aghitsna Iqbal Alif (2018), the ideal tariff is calculated by starting with the base tariff and incorporating additional components such as company overhead and the desired profit margin. The calculation involves the following key steps:

This represents the intended profit and is calculated based on the company's profit margin policy. Management Fee = Profit Margin Percentage × Base Tariff (2.5)

2. Overhead Costs

These include indirect expenses such as administrative costs, office equipment, warehousing, and staff salaries.

Overhead Cost = Overhead Percentage × Base Tariff (2.6)

3. Ideal Tariff Calculation

The ideal tariff is the total of the base tariff, management fee, and overhead costs: Ideal Tariff = Base Tariff + Management Fee + Overhead Cost (2.7)

Break-Even Point (BEP) Analysis

The Break-Even Point (BEP) analysis is a financial tool used to assess the relationship between fixed costs, variable costs, profit, and the volume of operations (in terms of sales or production). It is often referred to as Cost-Volume-Profit (CVP) Analysis. According to Harahap (2020), the BEP is the level of activity at which a company neither makes a profit nor incurs a loss; at this point, total sales revenue precisely equals total production costs.

Mathematical Approach

Kasmir (2020) defines the BEP mathematically as: Total Revenue (TR) = Total Cost (TC). Next, the break-even point in units can be calculated using the following formula: BEP (Q) = Fixed Costs (FC) / (Price per Unit (P) – Variable Cost per Unit (V)) (2.8)
Note:

- BEP (Q) = Break-even point in units
- FC = Fixed Costs
- P = Selling Price per Unit
- V = Variable Cost per Unit

BEP Based on Revenue (in Currency)

The break-even point can also be calculated in terms of revenue: BEP (IDR) = Fixed Costs / [1 – (Total Variable Cost (VC) / Total Sales (S))] (2.9)
Note:

- FC = Total Fixed Costs
- VC = Total Variable Costs
- S = Total Sales
- 1 = Constant

Return on Investment (ROI) Calculation

Mulyati and Aghitsna Iqbal Alif (2018) define Return on Investment (ROI) as the ratio between annual income and the capital invested. ROI serves as an indicator of the profitability of an investment and can be calculated using various methods, depending on whether factors such

as depreciation, taxes, interest, and other costs are considered. It is a critical metric for evaluating the financial performance and efficiency of capital utilization in transportation operations.

2.3 Previous Research

Several studies have explored the application of Break-Even Point (BEP) and Return on Investment (ROI) analyses in freight transportation and business planning. One such study was conducted by Ribka Agustin (2022) under the title *"Break-Even Point Analysis as a Profit Planning Tool at PT. Ikanindo Rekatama Cipta."* Agustin's research focused on determining the required level of sales to achieve the company's profit targets. Employing mathematical BEP analysis, the study specifically examined VAC product operations by analyzing variables such as raw material usage, sales volume, selling prices, variable costs, and fixed costs. The findings underscored the usefulness of BEP analysis in identifying the sales threshold necessary to avoid losses and realize planned profitability.

Another important contribution comes from Mulyati and Aghitsna Iqbal Alif (2018), whose study titled *"Ideal Tariff Planning for Freight Services Based on Vehicle Operating Cost (VOC) Calculation Method"* aimed to establish an ideal freight tariff structure. The study incorporated comprehensive cost analysis by calculating the base tariff, the BEP, and the ROI. Their approach emphasized the integration of cost components and profit planning to ensure tariff strategies that are both competitive and financially sustainable. The study offers a practical framework for freight companies to estimate profit margins while aligning tariff planning with operational costs.

Similarly, the research conducted by Entis Sutisna and Mardianah (2015), titled *"Analysis of Ideal Freight Tariff Determination for Raskin Rice Delivery by Bulog West Java Division Based on Vehicle Operating Cost (VOC) Method,"* explored tariff calculation within the context of government logistics operations. Their study calculated the annual operating costs of Bulog's fleet and aimed to determine a suitable freight tariff that ensures financial efficiency. In addition to tariff analysis, the research evaluated profitability through both BEP and ROI calculations, highlighting the importance of these tools in assessing revenue adequacy against expenditures in public-sector logistics.

3. Results and Discussion

Calculation of Operating Costs for a 2.5-Ton Pickup Truck

Table 1: General Vehicle Characteristics

Vehicle Characteristics	**Note**
Vehicle Type	Gran Max Pick Up 1.3 STD
Vehicle Capacity	2.5 tons
Fuel Type	petrol
Fuel Tank Capacity	43 L
Fuel Consumption per Kilometer	12.5 L / KM
Vehicle Price	IDR 300,200,000

Vehicle operational data is data that explains vehicle operational records, as described in table 2 below.

Table 2 Vehicle Operational Data

Freight (50 kg Rice)	**Note**
Total Load	40 sacks per shipment
Price per sack	IDR 485,000

Trip Length	Description
Delivery Frequency	1 trip per trip
Operating Days per Week	2 shipments
Operating Days per Year	104 trips / year
Vehicle Capacity	2.5 tons
Distance	Description
Daily Travel Distance (round trip)	51.8 km / day
Round Trip Travel Distance (round trip)	51.8 km / day
Annual Travel Distance	5,387.2 km / year

Calculation of Vehicle Operating Costs According to Variable Costs

a. Fuel Cost (Petrol)
- Daily distance traveled = 51.8 km/day
- Fuel consumption per kilometer = 12.5 km/liter
- Fuel consumption per liter per day = 4,144 liters/day
- Fuel price = IDR 10,000/liter
- Daily fuel consumption cost = IDR 41,440/day

Using the formula: Daily Fuel Consumption Cost = $\frac{\text{Daily Fuel Cost}}{\text{Daily Fuel Costi}}$ = $\frac{\text{IDR .41.440}}{\text{51,8 km}}$ = IDR 800 /KM/Day

With the formula for fuel usage costs per year

= 104 times/year × IDR 41,440 = IDR 4.309.760 / Year

b. Tire Cost
- Number of tires used = 4
- Tire lifespan = 25,000 km
- Price per tire = IDR 1,200,000 (Briston 14-inch tire)

With the tire cost formula= $\frac{\text{Tire Wear} \times \text{Tire Price}}{\text{Kilometer Tire Durability}}$ = $\frac{4 \times \text{IDR .1.200.000}}{\text{25.000 km}}$ = IDR 192 / km

So, the annual tire cost is Tire cost per kilometer × Mileage per year
= IDR 192 / km × 5,387.2 km / year = IDR 1,034,342 / year

c. Major service is carried out every 20,000 km

Table 3 Large Pick Up Service with 2.5 Ton Capacity

No	Items	**Price**	**Needs**	**Cost**
1	Engine oil	IDR 90,000 / L	4 L	IDR 360,000
2	Oil filter	IDR 35,000/pcs	1 pcs	IDR 35,000
3	Transmission oil	IDR 90,000 / L	4 L	IDR 360,000
4	Cooling fluid	IDR 130,000/ bottle	1 bottle	IDR 130,000
5	Spark plugs	IDR 27,000 / piece	4 pcs	IDR 110,000
6	Air filter	IDR 85,000/pcs	1 pcs	IDR 85,000
7	Brake fluid	IDR 60,000 / bottle	1 pcs	IDR 60,000
8	Grease	IDR 60,000/pcs	1 pcs	IDR 60,000

No	Items	Price	Needs	Cost
9	Battery fluid	IDR 10,000 / bottle	1 bottle	IDR 10,000
10	Service costs	IDR 513,500		IDR 513,500
11	Brake cleaner	IDR 90,000 / bottle	1 bottle	IDR 90,000
12	Axle oil	IDR 90,000 / L	4 L	IDR 360,000
	Total			IDR 2,173,500

Source: Research Results, 2025

- Major service costs per year

$= \frac{\text{IDR .2.173.500}}{\text{20.000/km}}$ = IDR 108,675 / km

= IDR 108,675 / km × 5,387.2 km / Year = IDR 585,453 / Year

d. Minor Service

Minor service is performed every 10,000 km.

Table 4. Small Pick Up Service with 2.5 Ton Capacity

No	Item	Price	Need	Cost
1	Service costs	IDR 110,000		IDR 110,000
2	Engine oil	IDR 90,000 / L	4 L	IDR 360,000
3	Axle oil	IDR 90,000 / L	4 L	IDR 360,000
4	Grease	IDR 60,000/pcs	1 pcs	IDR 60,000
5	Brake fluid	IDR 60,000 / bottle	1 pcs	IDR 60,000
6	Oil filter	IDR 35,000/pcs	1 pcs	IDR 35,000
7	Battery fluid top-up	IDR 10,000 / bottle	1 bottle	IDR 10,000
	Total cost			IDR 995,000

Source: Research Results, 2025

-

Service fee for minor service per year

$= \frac{\text{IDR.995.000}}{\text{10.000/km}}$ = IDR 99.5 / km

= IDR 99.5 / km × 5,387.2 km / year = IDR 536,026 / year

Examination fees general overhaul. It is done every 30,000 km, including :

a) Examination fees
- Wages = IDR 250,000
- Material = IDR 1,770,269.00

Total = IDR 2,020,269.00

b) General overhaul inspection costs per year

=(Km − mileage per year × Inspection cost)/(Inspection km)

$= \frac{\frac{5.387\text{km}}{\text{Year}} \times \text{IDR .2.020.269}}{\text{30.000 km}}$ = IDR 362,772 / year

c) General overhaul inspection cost per kilometer

$= \frac{\text{Inspection fee per year}}{\text{Mileage per year}}$

$= \frac{\text{IDR .362.772}}{5.387}$ = IDR 67.34 / km

Table 1Summary of Cost Calculations Operational According to Variable Costs / year

No	Cost Name	Amount
1	Fuel oil (pertalite)	IDR 4,309,760
2	Tire costs	IDR 1,034,342
3	Great service	IDR 585,453
4	Small service	IDR 536,026
5	Examination fees general (General Overhaul)	IDR 362,772
Total		IDR 6,828,353

Source : Research results , 2025

d) Calculation Cost Operational Vehicle According to Fixed Costs

a. Depreciation vehicle

Vehicle price new = IDR 200,300,000
Depreciation period = 5 years
Residual value = 20% = IDR 40,060,000
Depreciation vehicle $= \frac{(\text{Vehicle Price} - \text{Residual Value})}{(\text{Depreciation Period})}$
Depreciation vehicle $= \frac{\text{IDR .200.300.000} - \text{IDR .40.060.000}}{5 \text{ Years}}$
Depreciation vehicle $= \frac{\text{IDR .160.240.000}}{5 \text{ Years}}$ = IDR 32,048,000 / year

b. Vehicle tax
Vehicle tax = IDR 2,400,000 / year

c. Inspection test fee (KIR) = IDR 250,000
Inspection test fee (KIR) = IDR 250,000 × 2
Inspection test fee (KIR) = IDR 500,000 / year

d. Driver salary = IDR 3,600,000 / month
Driver salary = IDR 3,600,000 × 12 months
Driver salary = IDR 43,200,000 / year

e. Helper salary = IDR 2,055,000 / month
Helper salary = IDR 2,055,000 × 12 months
Helper salary = IDR 24,660,000 / year

f. Employee salary warehouse = IDR 2,055,000 / month
Employee salary warehouse = IDR 2,055,000 × 12 months
Employee salary warehouse = IDR 24,660,000 / year

g. Rental costs warehouse = IDR 70,000,000 / year

h. Billing fee electricity warehouse = IDR 800,000 / month
Billing fee electricity warehouse = IDR 800,000 × 12 months
Billing fee electricity warehouse = IDR 9,600,000

Table 2 Recapitulation Calculation Cost Fixed Operations / year

No	Cost Name	Amount
1	Depreciation vehicle	IDR 32,048,000
2	Vehicle tax	IDR 2,400,000
3	Inspection test costs (KIR)	IDR 500,000
4	Driver's salary	IDR 43,200,000
5	Helper salary	IDR 24,660,000
6	Employee salary warehouse	IDR 24,660,000
7	Rental costs warehouse	IDR 70,000,000
8	Electricity cost warehouse	IDR 9,600,000
	Total	IDR 207,068,000

Source : Research results , 2022

e) Determination of Basic Tariff , Basic Tariff

Following is calculation rates delivery goods based on method calculation cost operational vehicle .

BOK / Year = Cost fixed per year + Fees No fixed per year
= IDR 207,068,000.00 + IDR 6,828.35 3 = IDR 213,896,353

BOK / Month $= \frac{\text{BOK Per Year}}{12} = \frac{\text{Rp.213.896.353}}{12}$ = IDR 17,824,696

BOK / Day $= \frac{\text{BOK Per Month}}{\text{number of days in a month}} = \frac{\text{Rp.17.824.696}}{30}$ = IDR 594,156

Basic Fare $= \frac{\text{BOK Per Day}}{\text{Vehicle Capacity}} \times$ Mileage
$= \frac{\text{IDR .594.156}}{\text{2,5 Ton}} \times$ 51.8 km $= \frac{\text{IDR .594.156}}{\text{2.500 Kg}} \times$ 51.8 km = IDR 12,310 / Kg*Ideal Tariff Calculation*

Ideal Rate = Basic Rate + Management Fee (10%) + Overhead Cost (20%)
= IDR 12,310 + IDR 1,231 + IDR 2,462 = IDR 16,000 / sack bag rice
For 1 trip of 40 sacks is required cost as much as :
= 40 × IDR 16,000 = IDR 640,000 / return or per one way
Rates/ km $= \frac{\text{IDR .640.000}}{\text{51,8 km}}$ = IDR 12,355 / km

Analysis Break Event Point (BEP) calculation

The calculation results reveal the following financial details related to freight transportation operations. The total fixed cost incurred annually amounts to IDR 207,068,000, while the total variable (non-fixed) cost stands at IDR 6,828,353 per year. Consequently, the total vehicle operational cost (BOK), which includes both fixed and variable components, reaches IDR 213,896,353. The purchase price of rice at the warehouse is IDR 485,000 per sack, and the selling

price per sack is set at IDR 510,000. Each shipment consists of 40 sacks of rice, generating a total income of IDR 20,400,000 per delivery. The profit margin per sack is calculated by subtracting the warehouse price from the selling price, resulting in a gain of IDR 25,000 per sack. These figures provide a comprehensive overview of the operational and financial aspects of the transportation activity.

BEP (sack) = (Total BOK or Total Cost)/(Profit per bag) $= \frac{\text{IDR.213.896.353}}{\text{IDR .25.000}}$ = 8,556 sacks

BEP in frequency delivery

$$= \frac{\text{BEP in units}}{\text{Number of units per shipment}} = \frac{441}{40} = 214 \text{ times delivery}$$

Based on the results of the Break-Even Point (BEP) calculation, it can be concluded that the company will reach the break-even point—or begin to achieve a return on investment—once it has sold 8,556 sacks of rice, which corresponds to a total of 214 delivery trips.

Analysis Return on Investment (ROI) Calculation

In the Return on Investment (ROI) calculation, the ROI is expressed as a percentage. This percentage reflects the profitability of the investment. In this context, the higher the ROI percentage, the better or more profitable the investment is considered to be.

$$\text{ROI} = \frac{(\text{Revenue} - \text{Total Vehicle Operating Costs})}{\text{Total Vehicle Operating Costs}} \times 100\%$$

$$\text{ROI} = \frac{\text{IDR .20.400.000} - \text{Rp.213.896.353})}{\text{IDR .213.896.353}} \times 100\% = -90\%$$

An ROI value greater than 0 indicates that the business is generating a profit or a return on the capital invested. In contrast, an ROI value less than 0 signifies a financial loss, meaning the returns are insufficient to cover the costs incurred. In the ROI calculation presented earlier, the result was -90%, indicating a significant loss. A positive ROI reflects that the investment has produced gains exceeding the total investment costs. Conversely, a negative ROI suggests that the investment has failed to generate returns, and the sales revenue is inadequate to recover the expenses incurred.

Operational Cost Calculation Vehicle Canter Fe 71 M/T Box Capacity Truck

Table 3 General Characteristics of Vehicles

Description Characteristics Vehicle	Information
Type vehicle	Canter Fe 71M/T Box
Capacity vehicle	5.15 tons
Fuel	Solar
Capacity tank material burn	70 L
consumption per kilometer	8 km / liter
Vehicle price	IDR 607,500,000

Source : Research Results , 2025

Operational Cost Calculation Vehicle According to Variable Costs

a. Fuel Oil Costs (Diesel)

Distance traveled per day = 51.8 km / day
Fuel consumption per kilometer = 8 km / L
consumption per liter, per day = 6.475 L / day
Price of materials burn oil = IDR 6,800 / liter
usage cost per day = IDR 44,030

Material costs burn oil per kilometer

- $= \frac{\text{Fuel Usage Costs Per Day}}{\text{Distance Traveled Per Day}} = \frac{\text{IDR .44.030}}{\text{51,8km}} =$ IDR 850 /km usage costs per year = 104 times / year × IDR 44,030 = IDR 4,579,120

b. Tire costs

Amount tire usage = 4 pieces
Tire life = 25,000 km
Price per tire = IDR 1,450,000 (Ring 15 GJ)

Tire costs

$= \frac{\text{Number of Tire Uses} \times \text{Tire Price}}{\text{Tire Durability Kilometers}} = \frac{4 \times \text{IDR .1.450.000}}{\text{25.000 km}} =$ IDR 232 / km

Tire usage costs per year
= Tire cost per kilometer × Mileage per year
= IDR 232 / km × 5387.2 km / year = IDR 1,249,830

c. Major & Minor Service

Major service conducted every 20,000 km

Table 4Large Service for Canter Fe 71 M/T Box Truck with Capacity 5.15 Tons

No	Item	Price	Need	Cost
1	Engine oil	IDR 51,660 / L	9 L	IDR 464,940
2	Transmission oil	IDR 65,650 / L	6 L	IDR 262,600
3	axle oil	IDR 57,200 / L	4 L	IDR 228,800
4	Oil filter	IDR 108,000/ piece	1 pcs	IDR 108,000
5	Tuning club	IDR 59,500 / piece	1 pcs	IDR 59,500
6	Filter air	IDR 189,000/ piece	1 pcs	IDR 189,000
7	Back lamp (light)	IDR 5,000 / piece	2 pcs	IDR 10,000
8	Master brake	IDR 2,500,000/piece	1 pcs	IDR 2,500,000
9	Brake fluid	IDR 49,500 / piece	1 pcs	IDR 49,500
10	Battery water	IDR 14,750 / piece	5 pcs	IDR 73,750
11	Total Cost Work			IDR 1,197,700
Total cost				IDR 5,143,790

Source : Research results , 2025

Service fee large per year $= \frac{\text{IDR .5.143.790}}{\text{20.000 km}} =$ IDR 257,189 km
= IDR 257,189 km × 5,387.2 km / year = IDR 1,385,528 / year

Minor service

Minor service conducted every 10,000 km

Table 5Small Service of Canter Fe 71 M/T Box Truck with Capacity 5.15 Tons

No	Item	Price	Need	Cost
1	Engine oil	IDR 51,660 / L	9 L	IDR 464,490
2	Transmission oil	IDR 65,650 / L	6 L	IDR 262,600
3	Axle oil	IDR 57,200 / L	4 L	IDR 228,800
4	Fat	IDR 60,000 pcs	2 pcs	IDR 120,000
5	Brake fluid	IDR 49,500 / piece	1 pcs	IDR 49,500
6	Battery water	IDR 14,750 / piece	5 pcs	IDR 73,750
7	Total cost Work			IDR 284,200
Total cost				IDR 1,483,340

Source : Research results , 2025

Service fee for minor service per year

$= \frac{\text{IDR .1.483.340}}{\text{10.000 km}}$ = IDR 148,334 km

= IDR 148,334 km × 5,387.2 km = IDR 799,104 / year

d. Examination fees general (General Overhaul)

Done every 30,000 km

a) Examination fees

Wages = IDR 350,000

Material = IDR 2,500,000

= IDR 2,850,000

b) Inspection costs (General Overhaul) per year

$= \frac{\text{km traveled per year} \times \text{inspection cost}}{\text{inspection km}}$

$= \frac{\frac{5.387,2}{\text{Year}} \times \text{Rp.2.850.000}}{\text{30.000 km}}$ = IDR 511,784

c) Inspection cost (General Overhaul) per kilometer

= Inspection fee per year/mileage per year $= \frac{\text{Rp.511.784}}{\text{5.387,2 km}}$ = IDR 95 / km

Table 6 Recapitulation Calculation Cost Operational According to Variable Costs / Year

No	Cost Name	Amount
1	Material costs burn oil (diesel)	IDR 4,579,120
2	Tire costs	IDR 1,249,830
3	Service fee big	IDR 1,385,528
4	Service fee small	IDR 799,104
5	Examination fees general (General Overhaul)	IDR 511,784
	Total	IDR 8,525,366

Source : Research results , 2025

Operational Cost Calculation Vehicle According to Fixed Cost / Year

Depreciation vehicle
Vehicle price new = IDR 607,500,000
Depreciation period = 5 years
Residual value = = 20% × IDR 607,500,000 = IDR 121,500,000

$$\text{Depreciation vehicle} = \frac{\text{Vehicle Price} - \text{Residual Value}}{\text{Depreciation Period}}$$

$$\text{Depreciation vehicle} = \frac{\text{IDR .607.500.000} - \text{IDR .121.500.000}}{\text{5 Year}}$$

$$\text{Depreciation vehicle} = \frac{\text{IDR .486.000.000}}{\text{5 Year}} = \text{IDR 486,000,000 / year}$$

Vehicle tax
Vehicle tax = IDR 2,906,000 / year

Inspection test fee (KIR) = IDR 250,000
Inspection test fee (KIR) = IDR 250,000 × 2
Inspection test fee (KIR) = IDR 500,000

Driver salary = IDR 3,600,000 / month
Driver salary = IDR 3,600,000 × 12 months
Driver salary = IDR 43,200,000 / year

Helper salary = IDR 2,055,000 / month
Helper salary = IDR 2,055,000 × 12 months
Helper salary = IDR 24,660,000 / year

Employee salary warehouse = IDR 2,055,000 / month
Employee salary warehouse = IDR 2,055,000 × 12 months
Employee salary warehouse = IDR 24,660,000 / year

Rental costs warehouse = IDR 70,000,000 / year
Billing fee electricity warehouse = IDR 800,000 / month
Billing fee electricity warehouse = IDR 800,000 × 12 months
Billing fee electricity warehouse = IDR 9,600,000 / year

Table 7 Recapitulation Calculation Cost Operational According to Fixed Cost / Year

No	Cost Name	Amount
1	Depreciation vehicle	IDR 486,000,000
2	Vehicle tax	IDR 2,906,000
3	Inspection test costs (KIR)	IDR 500,000
4	Driver's salary	IDR 43,200,000
5	Helper salary	IDR 24,660,000
6	Employee salary warehouse	IDR 24,660,000
7	Rental costs warehouse	IDR 70,000,000

No	Cost Name	Amount
8	Electricity cost warehouse	IDR 9,600,000
	Total cost	IDR 661,526,000

Source : Research results , 2025

Determination of Basic Rates

Following is calculation rates delivery goods based on method calculation cost operational vehicle transport goods.

BOK / Year = Cost fixed per year + Fees No fixed per year
= IDR 661,526,000 + IDR 8,525,366 = IDR 670,051,366

BOK / Month $= \frac{\text{BOK Per Year}}{12} = \frac{\text{Rp.670.051.366}}{12}$ = IDR 55,837,613

BOK / Day $= \frac{\text{BOK Per Month}}{\text{Total Days per month}} = \frac{\text{Rp.55.837.613}}{30}$ = IDR 1,861,253

Basic Rate/ Principal $= \frac{\text{BOK Per Hari}}{\text{Vehicle Capacity}} \times$ Mileage

$= \frac{\text{IDR .1.861.253}}{\text{5,15 ton}} \times 51{,}8$ = IDR 18,720 kg

Ideal Rate Calculation

The ideal rate for freight transportation is calculated by summing the basic rate, management fee, and overhead cost. Specifically, the management fee is set at 10% of the basic rate, while the overhead cost accounts for 20%. Based on this, the ideal rate can be expressed as follows:

Ideal rate = Basic Rate + Management Fee (10%) + Overhead Cost (20%)
Ideal rate = IDR 18,720 kg + IDR 1,872 kg + IDR 3,744 kg = IDR 24,336 / bag rice

For a single transportation trip using a Canter FE 71 M/T box truck, which has a capacity of 5.15 tons and can carry 100 sacks of rice (each weighing 50 kg), the total transportation cost per trip is calculated by multiplying the number of sacks by the ideal rate per sack: 100 × IDR 24,336 = IDR 2,433,600 / ret or per one way

With tariff / km $= \frac{\text{IDR .2.433.600}}{\text{51,8}}$ = IDR 46,980 / km

Analysis Break Event point calculation

The financial analysis of the freight transportation operation yields the following results. The total fixed cost per year is IDR 661,526,000, while the total variable (non-fixed) cost is IDR 8,525,366 annually. Combining both fixed and variable components, the total Vehicle Operational Cost (BOK) amounts to IDR 670,051,366. The purchase price of rice in the warehouse is IDR 485,000 per sack, and it is sold at IDR 510,000 per sack. Each shipment transports 100 sacks, resulting in a total income of IDR 51,000,000 per delivery. The profit earned per sack is IDR 25,000, which is the difference between the selling price and the warehouse purchase price. These figures highlight the cost structure and profitability potential of the transportation business on a per-shipment basis.

BEP (unit) = (Total BOK or Total Cost)/(Profit per bag) =

$$\frac{\text{Rp.670.051.366}}{\text{Rp.25.000}} = 26{,}802 \text{ sacks}$$

BEP in frequency delivery

$$= \frac{\text{BEP in unit}}{\text{Number of units per shipment}} = \frac{26.802}{100} = 268 \text{ times delivery}$$

Based on the results of the Break-Even Point (BEP) calculation above, it can be concluded that the company will reach the break-even point—or begin to realize a return on investment—once sales reach 26,802 sacks of rice, corresponding to 268 shipments.

Analysis Return on Investment Calculation

In the Return on Investment (ROI) calculation, the ROI is expressed as a percentage. This means that the higher the ROI percentage, the more profitable or favorable the investment is considered to be.

ROI

=(Revenue Total Vehicle Operating Costs)) (Total Vehicle Operating Costs) $\times 100\%$

$$\text{ROI} = \frac{\text{IDR .51.000.000} - \text{Rp.670.051.366)}}{\text{IDR .670.051.366}} \times 100\% = -92\%$$

An ROI value greater than 0 indicates that a business is generating a profit or benefit from its investment. Conversely, an ROI less than 0 signifies that the business or company is experiencing a loss. In the ROI calculation presented above, the resulting ROI is -92%, indicating a significant loss. A positive ROI means that the investment yields returns exceeding the total costs or capital invested. On the other hand, a negative ROI means that no returns were generated from the investment, and sales revenue is insufficient to cover the investment costs

4. Conclusion

Based on the comprehensive data processing and analysis conducted in this study, several key conclusions can be drawn. The operational cost (*Biaya Operasional Kendaraan* or BOK) for transportation using a 2.5-ton Pickup Truck, including both fixed and variable costs, amounts to IDR 213,896,353. Correspondingly, the ideal transportation rate per sack of rice is estimated at IDR 16,000, resulting in a cost of IDR 640,000 for a single trip carrying 40 sacks one way. The Break-Even Point (BEP) analysis indicates that profitability will be achieved once sales reach 8,556 sacks of rice, with a shipment frequency of 214 trips. However, the Return on Investment (ROI) for this transportation method is calculated at -90%, suggesting that current operations are not yet profitable.

For transportation using the Canter FE 71 truck with a larger capacity of 5.15 tons, the total operational cost is higher at IDR 670,051,366. The ideal rate per sack correspondingly increases to IDR 24,336, leading to a trip cost of IDR 2,433,600 for 100 sacks one way. The BEP for this mode of transport is considerably higher, with 26,802 sacks and 268 shipments required to break even. Similar to the Pickup Truck, the ROI here is negative at -92%, indicating a need for operational improvements. Notably, while the Pickup Truck reaches the break-even point faster due to its lower operational costs, the Canter FE 71 truck offers a superior transport volume capacity, presenting a trade-off between cost efficiency and cargo capacity.

Considering the findings of this study, several recommendations can be made to improve operational and financial performance. First, the cost calculations for the 2.5-ton Pickup Truck provide useful benchmarks for establishing transportation rates and per-kilometer costs, which can serve as a reference point for setting tariffs based on delivery distances from the Single Son rice warehouse. Secondly, it is advisable for the warehouse management to clearly separate fixed and variable costs in their accounting practices. This segregation is essential to accurately

calculate the Break-Even Point and establish realistic sales targets that align with profit objectives.

Furthermore, to enhance financial viability, efforts should focus on increasing both sales volume and delivery frequency, which are critical for generating sufficient returns to cover capital investments and operational expenses. Lastly, while the Pickup Truck offers a faster route to break-even due to its lower operating costs, the Canter FE 71 truck's larger capacity can be leveraged for higher-volume shipments. Therefore, a balanced approach that considers both cost efficiency and transport volume should guide vehicle utilization decisions to optimize overall profitability.

Acknowledgment

The authors would like to express their sincere gratitude to the editorial board and reviewers of the *TIJOSSW* journal for their valuable guidance, constructive feedback, and support throughout the manuscript preparation and publication process. Their insightful comments have significantly contributed to improving the quality and clarity of this study. We also appreciate the opportunity to share our research findings with the wider academic community through this reputable journal.

References

Abdulkadir, M. (1991). *Hukum pengangkutan darat, laut, dan udara*. PT. Citra Aditya Bakti.

Agustin, R. (2022). *Analisis break even point sebagai alat bantu perencanaan laba pada PT. Ikanindo Rekatama Cipta* [Break-even point analysis as a profit planning tool at PT. Ikanindo Rekatama Cipta] [Undergraduate thesis, Universitas Kristen Duta Wacana]. Repository UKDC.

Alwi, S. (2009). *Analytical tools in spending*. Andi Offset.

Bali Governor Regulation. (2018). *Cost calculation guidelines for operational vehicle Trans Sarbagita public transportation*. Head of the Transportation Agency, Bali Province.

Directorate General of Highways. (1997). *Indonesian road capacity manual (MKJI)*. Department of Public Works.

Directorate General of Land Transportation. (2002). *Technical guidelines for the implementation of public transportation in urban areas on fixed and regular routes (Decree SK.687/AJ.206/DJRD/2002)*. Directorate General of Land Transportation.

Harahap, S. S. (2020). *Analysis of the financial report*. [Publisher not specified].

Hartono, R. S. (1980). *Transportation and land transportation law* (p. 8). Undip Publisher.

Haryanto, A. (2021). *Operational cost analysis of vehicle trucks (Case study: Trucks on Kayangan Sheet route)* [Unpublished thesis]. Muhammadiyah University of Mataram.

Kasmir. (2010). *Introduction to financial management*. PT. Prenadamedia Group.

Ministry of Public Works and Public Housing of the Republic of Indonesia. (2022). *Unit price analysis for jobs (AHSP) Part III General Field*.

Mulyadi. (2005). *Cost accounting* (7th ed.). YKPN.

Mulyati, E., & Alif, A. I. (2018). Planning ideal shipping rates based on calculation methods of operational vehicle costs. *Scientific Journal of Industrial Engineering, 12*(2), [page numbers not provided].

Mulyati, E., & Alif, A. I. (2023). Perencanaan tarif ideal untuk layanan pengiriman barang berdasarkan metode perhitungan biaya operasional kendaraan (BOK) [Ideal tariff planning

for freight services based on vehicle operating cost (VOC) calculation method]. *Jurnal Logistik Bisnis, 6*(1), 1–12. https://doi.org/10.30741/logistik.v6i1.90

Nariendra, P. W., & Rezki, Y. M. (2019). Analysis of freight transport tariffs on the Deltamas route Cikarang–Ciracas based on operational vehicle costs. *Journal of Business Logistics, 9*(1), [page numbers not provided].

Nasution. (2006). *Transportation management*. Ghalia Indonesia.

Ribka, A. (2022). *Break-even point analysis as a profit planning tool at PT. Ikanindo Rekatama Cipta* [Unpublished thesis]. Darma Cendika Catholic University.

Rizkiansyah, M. (2022). *Advantages and disadvantages of various modes of transportation*. Accessed April 28, 2022, at 20:00 WIT.

Soekardono, R. (1981). *Indonesian commercial law* (Vol. 1, Part 1). Dian Rakyat.

Soesilo. (2019). *Economics of urban planning and management*. Master of Planning and Public Policy, University of Indonesia.

Sutisna, E., & Mardianah. (2016). Analisis penetapan tarif ideal angkutan pengiriman beras Raskin Perum Bulog Divre Jabar berdasarkan metode biaya operasional kendaraan (BOK) [Analysis of ideal freight tariff determination for Raskin rice delivery by Bulog West Java Division based on vehicle operating cost (VOC) method]. *Jurnal Logistik Bisnis, 6*(1), 1–12. https://doi.org/10.30741/logistik.v6i1.90

Tamin, O. Z. (2017). *Planning and modeling transportation*. ITB Publisher.