

Longboat Tariff Calculation Optimization (Case Study: Palembang-Line 8 Route)

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River passenger transportation via longboats currently operates without fixed fares. Costs are set by mutual agreement rather than actual expenses, resulting in inflated prices. Boats typically depart only when full, resulting in extended wait times. This study seeks to establish an equitable payment system based on the tariff formulation in PM Number 61 of 2021. Factors influencing fare determination were systematically examined, and optimal fares were calculated for both passengers and operators. Data collection involved surveys and interviews to assess operating costs and get passenger feedback. Comprehensive methods, including statistical analysis and Multilinear Regression (MLR) using SPSS version 26, identified the key drivers of fares. Results show an optimal fare of IDR 1,027 per kilometer, or IDR 46,233 per passenger. This reflects a strong willingness to pay among passengers and exceeds the VOC fare of IDR 38,767 per passenger. An IDR 9,242 subsidy could reduce fares and boost demand, ensuring compliance with public transportation regulations. This approach is expected to enhance accessibility and increase profitability in river passenger transport.

Keywords: Optimization; Tarif; VOC; WTP; MLR

INTRODUCTION

The Musi River divides the city of Palembang into two parts, namely Ilir and Ulu. River transportation from the town of Palembang plays a vital role in helping people living in the water area carry out their activities. One of the river passenger transport options on the Musi River is the longboat, but it does not have a fixed rate; it is based on mutual agreement, which, of course, is more expensive. There is no calculation of the fare based on vehicle operating costs, passenger waiting time, or extended travel time, because the boat has to wait in line until the passenger is full before moving. Passengers' travel satisfaction decreases when services are crowded or unreliable and when waiting times are long (Cantwell et al., 2009).

However, riverside communities have no choice but to use river transportation. In urban areas like Palembang, high-quality public transportation attracts passengers, but the demand effect is too small to offset the revenue loss from lower fares. Ship operational costs are expenses incurred during ship operations, including crew and shore staff wages, maintenance, depreciation, and overhead. Fuel costs, which continue to rise, can have a significant impact, harming operators, passengers, and the service's sustainability. Fuel oil is one of the factors that influences the nominal components of public transportation calculations (Mahendra et al., 2016). This requires in-depth analysis to understand the factors that significantly influence rates.

Several previous studies have been conducted to determine river transportation rates on the Musi River (Febriansyah et al., 2019; Stevany, 2025; Mustofa, 2021; Beriyanto, 2025) by using ship operational cost calculations based on regulations containing components that have been set to ensure the feasibility of tariffs that are often used as a general reference for other water transportation. The results of the tariff calculation based on the VOC are IDR. 13,694/passenger/km with a load factor of 100% to optimize the use of water tourist buses (cruises) in Palembang City (Febriansyah et al., 2019), the potential interest level in using river transportation is 40-41% with the ideal river transportation fare being IDR. 690/km or IDR. 15,180 for a distance of 22 km from Sementul to the 16 Ilir pier (Stevany, 2025). Besides that, (Mustofa, 2021) analyzes the suitability of speedboat fares from Ampera Pier - Telang Route 8 on weekdays, which are higher than on weekends, for a willingness-to-pay of IDR. 45,690, but lower than the current applicable fares, this is in line with (Beriyanto, 2025), which states that the ideal river transportation fare is. Based on operational costs and public purchasing power, it is lower than the current fare.

Based on the background above, this study aims to analyze the factors influencing tariff determination, calculate optimal tariffs, and develop a tariff payment system based on passenger preferences.

LITERATURE REVIEW

River and lake transportation fares are the prices users pay for services on these routes. River and lake transportation fares consist of passenger and freight fares. Transportation operators set economy and non-economy class passenger fares based on the level of service provided. Passenger transportation fares are determined based on a tariff formula established by authorized officials (PM 61, 2021). Transportation fares are prices set and intended for users of transportation services, commonly called passengers. In pricing, the concept of the three "Cs" explained by Kotler and Keller refers to the analysis carried out by companies, namely costs, competitors, and customers, aimed at

determining rates that can maximize the company's profitability, in line with the overall marketing strategy (Tjiptono, 2016). According to (Salim, 2019), pricing is calculated based on transport capacity, typically determined by distance traveled and the amenities available on public transportation. Fare policy is divided into three categories, which are:

- a. Cost of service pricing: the rates reviewed are based on the costs required to operate transportation services plus a reasonable profit margin.
- b. Value-based service pricing: rates are reviewed in relation to the value of the transportation services provided by users.
- c. Charging what the traffic will bear, transportation rates are evaluated against a specific transportation volume to determine the most profitable net income results.

The rates reviewed are based on the costs of operating the transportation service, plus a reasonable profit margin. Vehicle operating costs (VOC) are the economic costs of operating a vehicle in normal conditions for a specific purpose, such as transportation. Fuel is one of the factors that influences the VOC nomina (Mahendra et al., 2016). The calculation of river transportation tariffs according to KM 73 in 2004 has added 2 (two) variables in the VOC, namely the cost of credit (data package) and the cost of kepil (rope fastener) (Beriyanto, 2025). These costs are already included in the latest tariff regulations for river transportation, namely PM 61 of 2021, covering salaries and equipment for land-based employees. Operational costs calculated using the budget method include both variable and fixed costs. Variable costs include fuel, lubricants, berthing, and passenger fresh water. Fixed costs include crew salaries, crew health/welfare costs, crew meals, work equipment costs (crew uniforms), land-based employee salaries, land-based employee meals, work equipment costs, daily ship maintenance costs, and ship insurance costs (for insured ships). In addition to fixed and variable costs, there are also overhead costs and annual maintenance.

The most influential variable, according to (Sugiyono, 2019), is multilinear regression (MLR), a valuable statistical method for exploring relationships among multiple independent variables and a dependent variable. To ensure reliable results, it is essential to meet the classical assumptions of normality, multicollinearity, autocorrelation, and heteroscedasticity. The MLR model effectively captures these relationships, where the dependent variable (y) is linked to one or more independent variables (Tamin, 2008).

The (MLR) equation is expressed as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_nX_n + e$$

Information

Y = Dependent variable
 X_i = Independent variable
 a = Constant or intercept

b_i = The regression coefficient or slope for variable X_i is the average change when X_i increases by one unit.

e = error or mistake

After the model is run in statistical software, the F-test is a powerful tool for assessing the collective impact of multiple independent variables on a dependent variable. This simultaneous test evaluates whether the variables (X_1, X_2, \dots, X_n) significantly influence the dependent variable, often denoted Y . The null hypothesis (H_0) posits that there is no effect from the independent variables, mathematically expressed as $b_1 = b_2 = \dots = b_n = 0$. In simpler terms, this hypothesis states that changes in the independent variables do not affect the dependent variable. To determine whether to reject the null hypothesis, analysts examine the p-value from the F-test. If the p-value is less than the significance level of 0.05, it indicates that there is sufficient evidence to reject H_0 . This rejection

implies that at least one independent variable has a statistically significant effect on the dependent variable, suggesting that the components being studied (in this case, the VOC components) do indeed influence Y when considered together.

Furthermore, the coefficient of determination (R^2) provides insight into the explanatory power of the independent variables. It quantifies the proportion of variance in the dependent variable that can be attributed to the independent variables. For instance, an R^2 value of 0.65 indicates that 65% of the variability in the dependent variable (Y) can be explained by the independent variables (X_1, X_2, X_n). This leaves 35% of the variability unexplained, which could be attributed to other factors not included in the model or inherent randomness. In summary, the F-test and the coefficient of determination are crucial in understanding the relationships between variables in a regression analysis. They not only help validate the significance of the independent variables but also assess how well these variables explain the behavior of the dependent variable. This dual approach enables researchers and analysts to draw meaningful conclusions from their data, guiding decision-making with statistical evidence.

A more detailed analysis of Vehicle Operating Costs (VOC) can be conducted using Microsoft Excel. Excel is a software program designed to manage and calculate numerical data. In practice, this program enables users to process data to produce optimal values (Winston, 2019). Microsoft Excel, also known as Microsoft Office Excel, is a spreadsheet application developed and distributed by Microsoft Corporation, compatible with both Windows and Mac OS. The application features excellent calculation and graphing capabilities, which, combined with Microsoft's aggressive marketing strategy, have made Excel one of the most popular software programs used on both microcomputers and macrocomputers. As a result, it is currently the most widely used spreadsheet program in the world on both Windows-based PCs and Macintosh platforms using Mac OS (Rofik, 2013). Optimization involves searching for the best value (maximum or minimum) of a function and its objectives, and Excel serves as a tool for decision-making (Winston, 2019).

Optimizing rates is the process of identifying the price point that maximizes a specific objective typically profit while accounting for operational costs, market demand, and the competitive landscape. The first step in this process is to calculate the basic cost (cost-plus pricing) by assessing operating and non-operating costs. This helps establish the lower limit (floor price), which represents the minimum price above which operations can be sustained. The formula for determining the lower limit rate is: lower limit rate = VOC + indirect costs; setting rates below this threshold can lead to operational losses. When determining optimal rates, it is essential to consider customer willingness to pay (WTP) and competitor pricing through a WTP survey. WTP is the maximum amount consumers are willing to pay for a product or service.

Additionally, competitor analysis should involve calculating the average rates charged by competitors for similar services, enabling pricing that is either lower than competitors' or focused on providing greater value or service. This analysis serves as the foundation for tariff policy. If the profitability gap is large while the affordability gap is small, the recommended approach is to increase the tariff to better align with WTP. Conversely, both the profitability and affordability gaps are significant. In that case, the recommendation is to enhance VOC efficiency (thus reducing the lower limit tariff) and improve quality before considering a tariff increase. Ultimately, this process seeks to identify the tariff point that optimizes profits. According to (Wallimann et al., 2023), by analyzing changes in demand alongside price changes, we can estimate the price

elasticity of demand using the formula: Price Elasticity of Demand = (Percentage change in demand) / (Percentage change in price).

RESEARCH METHOD

This research was conducted at the 16 Ilir River Port, Palembang City, with the research object being longboats operating on the Palembang-Route 8 route.



Figure 1a. Research Location



Figure 1b. boarding and disembarking passengers

The data used in this study includes both primary and secondary sources. Primary data collection involved conducting surveys and interviews with operators regarding the operational costs of longboats, in accordance with the Regulation of the PM Number 61 of 2024 for the Palembang-Line 8 route. Additionally, passenger perception questionnaires regarding longboat fares were distributed at the lower Ampera Pier of Sungai 16 Ilir Port from 08:00 to 16:00 WIB over the course of one week. Thursday was identified as the peak day for passenger traffic during the productivity survey. On average, 297 passengers boarded and disembarked from five longboats operating daily on the Palembang-Line 8 route. Questionnaires were distributed to 100 people selected from this population of 297, utilizing a non-probability sampling technique known as accidental sampling, with the sample size determined using the Slovin formula. The longboat fare questionnaire consisted of three main sections:

1. Respondent Characteristics: This section aimed to identify the demographics of passengers/respondents, including gender, age, occupation, and income.
2. Travel Purpose and Frequency: This part explored the reasons for travel, the frequency of using river transportation, and the use of connecting transportation.
3. Perception of Operating Cost Factors: This section included seven factors related to operating costs, including crew health and welfare costs, crew work equipment costs, insurance costs, salaries for landline employees, food and equipment costs for landline employees, and port/pier costs. It also assessed the respondents' willingness to pay longboat fares.

Data analysis was performed using descriptive statistics, crosstabulation, and multiple linear regression (MLR), facilitated by SPSS Version 26. The study culminated in an optimal fare recommendation that balances operational costs with passenger willingness to pay. A flowchart of the research process is shown in [Figure 2](#).

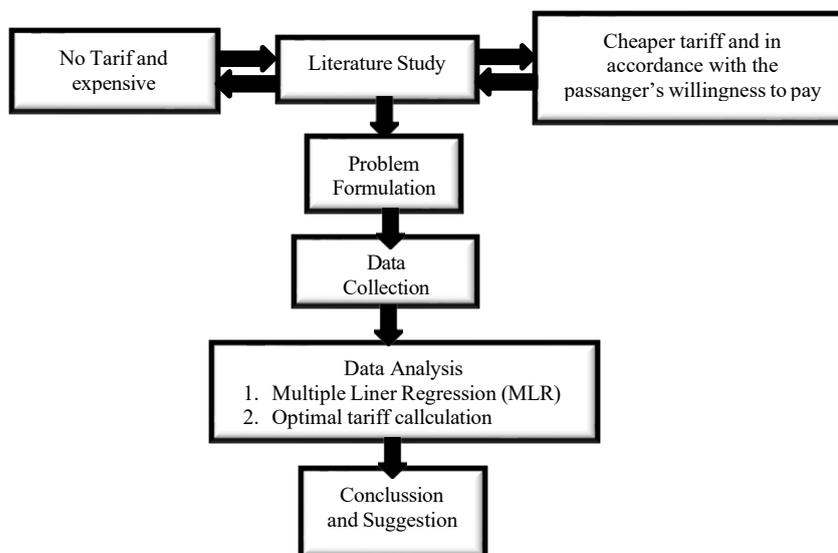


Figure 2 Research Flow Diagram

RESULTS

Longboat is one of the river transport modes serving passengers at Pier 16, Ilir, Palembang City. Based on the monthly report obtained from the 7 Ulu Port Service Unit at BPTD Class II South Sumatra, the number of longboats operating in Palembang that have been registered and certified is 96 ships for the Palembang-Line 8 route, five ships are operating every day with a capacity of 28 people covering a distance of 45 km (Palembang to the Route) for 2.8 hours at an average speed of 16 km/hour. The fare charged is IDR. 85,000 per person. The average longboat sails two trips per day, so that in a year, as many as 730 trips/year. Data on the type, dimensions, and registration of longboats operating on the Palembang - Line 8 route can be seen in [Table 1](#):

Table 1. Dimensions of Longboat

Ship Name	GT	Size/Dimensions			duction year	Machine	Selar Sign
		Long	Wide	In			
Giri Indah	3	12	1.8	1.5	2017	Yamaha 200 PK	C.PLG-4780
Amora	3	8.33	2.07	0.65	2018	Yamaha 200 PK	C.PLG-6497
Haras Group I	3	8.33	2.07	0.65	2018	Yamaha 200 PK	C.PLG-6497
Haras Group II	3	8.33	2.07	0.65	2018	Yamaha 200 PK	C.PLG-6497
Navy blue	3	8.33	2.07	0.65	2018	Yamaha 200 PK	C.PLG-6497

Source: 7 Ulu Service Unit, 2025

The results of the questionnaire on respondents' characteristics are: female gender (51 people), age 25-34 years (45 people), occupation: traders (44 people), income: 1.5-3 million, and purpose of work travel: 32 people. Travel characteristics for river travel frequency. The results of the questionnaire on respondents' characteristics are: female gender (51 people), age 25-34 years (45 people), occupation: traders (44 people), income: 1.5-3 million, and purpose of work travel: 32 people. Travel characteristics for the frequency of using the most river transportation is < 3 Twice a month, as many as 75 people use the most advanced transit, while city transportation carries as many as 47 people. The crosstabulation results for gender and income showed that female respondents aged 25-34 years with an income of 1.5 - 3 million were predominantly women in adulthood. The results of the crosstabulation of travel characteristics can be

concluded that the purpose of the trip for tourism, with the continued transportation used, is city transportation, using river transportation, with a frequency of <3 Times a month. Perceptions for operating cost factors that affect the tariff are the cost of health and welfare of the ship's crew (X1) as many as 72 people answered agree, the cost of work equipment of the ship's crew (X2) as many as 76 people answered agree, insurance costs (X3) as many as 72 people answered agree, the cost of salaries of land employees (X4) as many as 68 people answered agree, the cost of food for land employees (X5) as many as 84 people answered agree, the cost of equipment for land employees (X6) as many as 76 people answered agree and port/pier costs (23). Perception of willingness to pay (WTP) for a longboat: In your opinion, the fare for this trip is expensive. Of the 58 people who answered, how many would be willing to pay the maximum amount of IDR.? 85,000 the same as the current fare, for the variable how much do you agree that the current fare is comparable to the quality of service (safety, punctuality and comfort) that you receive as many as 51 people disagree, If the fare of this longboat increases by 10% (for example from IDR. 50,000 to IDR. 55,000 will you switch to another mode of transportation (for example land) as many as 52 people might switch, What is the maximum fare increase (percentage) that you can still accept the sign of switching to another mode of transportation on the variable as many as 57 people cannot accept the price increase at all, If the fare is increased, what facilities or service improvements do you most expect in return on the variable as many as 47 people answered none, the fare must remain the same.

Statistical testing of passenger perceptions confirmed the validity and reliability of the research instruments. Validity was confirmed by an r value exceeding the r Value in the Table and a significance level below 0.05. The reliability test yielded a Cronbach's Alpha of 0.772, indicating reliability above the 0.60 threshold.

The Multiple Linear Regression (MLR) analysis examined the following hypotheses regarding passenger willingness to pay (WTP) for longboat fares:

1. Ho: No significant simultaneous influence of the seven factors on WTP.
2. Ha: Significant simultaneous influence of the seven factors on WTP.

The summary model showed a strong positive correlation ($R = 0.892$) between the independent variables (seven factors) and the dependent variable (WTP). The R-squared value of 0.796 indicates that the independent variables explain 79.6% of the variation in WTP, while the remaining 21.4% is due to other factors. The MLR results provided the regression equation as follows:

$$Y = 4.235 - 0.235X_1 - 0.044X_2 + 0.156X_3 + 0.582X_4 - 0.409X_5 + 0.318X_6 + 0.233X_7$$

The MLR analysis summary model reveals a robust positive correlation between the observed dependent variables and the model's predicted values, evidenced by an R value of 0.757 and an R-squared value of 0.573. This indicates that 57.3% of the variance in the dependent variable is explained by the interplay among the seven independent variables included in our study. Furthermore, the ANOVA test results indicate the model's significance, with an F-test P-value of 0.004, well below the 0.05 threshold. This clearly establishes that our model is statistically sound. The collinearity statistics, particularly the Tolerance and VIF measures, affirm the model's reliability, as all VIFs remain below 3. Notably, of the seven variables examined, only the costs associated with land employee salaries, meals, and equipment emerged as significant predictors of the tariff. This underscores that tariff adjustments are highly sensitive to fluctuations in these specific costs, while other operational and cost variables lack predictive reliability.

Additionally, interviews with operators on the operational cost components for longboats on the Palembang-to-route 8 route emphasize the need to incorporate the costs of land-based employee salaries, meals, and equipment. While these costs were initially overlooked, they can be accurately estimated based on the region's minimum wage, further reinforcing the need for a comprehensive understanding of these factors in tariff determination. Transportation is <3 Twice a month, as many as 75 people use the most advanced transportation, while city transportation carries as many as 47 people. The crosstabulation results for gender and income showed that female respondents aged 25-34 years with an income of 1.5 - 3 million were predominantly women in adulthood. The results of the crosstabulation of travel characteristics can be concluded that the purpose of the trip for tourism, with the continued transportation used, is city transportation, using river transportation, with a frequency of < 3 Times a month. Perceptions for operating cost factors that affect the tariff are the cost of health and welfare of the ship's crew (X1) as many as 72 people answered agree, the cost of work equipment of the ship's crew (X2) as many as 76 people answered agree, insurance costs (X3) as many as 72 people answered agree, the cost of salaries of land employees (X4) as many as 68 people answered agree, the cost of food for land employees (X5) as many as 84 people answered agree, the cost of equipment for land employees (X6) as many as 76 people answered agree and port/pier costs (23). Perception of willingness to pay (WTP) for a longboat: In your opinion, the fare for this trip is expensive. Of the 58 people who answered, how many would be willing to pay the maximum amount of IDR. 85,000 the same as the current fare, for the variable how much do you agree that the current fare is comparable to the quality of service (safety, punctuality and comfort) that you receive as many as 51 people disagree, If the fare of this longboat increases by 10% (for example from IDR. 50,000 to IDR. 55,000 will you switch to another mode of transportation (for example land) as many as 52 people might switch, What is the maximum fare increase (percentage) that you can still accept the sign of switching to another mode of transportation on the variable as many as 57 people cannot accept the price increase at all, If the fare is increased, what facilities or service improvements do you most expect in return on the variable as many as 47 people answered none, the fare must remain the same.

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Table 2. Components of VOC longboats (IDR)

NO	VOC Components	Longboat Name				
		Giri Indah	Amora	Haras Group I	Haras Group II	Biru laut
Fixed Costs						
1	Crew salary costs	40,000	50,000	45,000	45,000	IDR. 40,000
2	Crew health/welfare costs	30,000	40,000	50,000	45,000	IDR. 45,000
3	Crew Meal Costs	20,000	25,000	22,000	20,000	IDR. 20,000
4	Work equipment costs (crew uniforms)	300,000	350,000	400,000	00,000	IDR. 300,000
5	Landline employee salary costs	50,000	50,000	50,000	50,000	50,000
6	Employee Meal Costs	20,000	20,000	20,000	20,000	20,000
7	Work equipment costs (landline employee uniforms)	250,000	275,000	350,000	300,000	250,000
8	Daily maintenance costs (spare parts, supporting equipment, certificates and repowering)	1,750,000	1,500,000	1,600,000	1,650,000	1,500,000
9	Ship insurance costs (for insured ships)	30,000	40,000	50,000	30,000	30,000
Variable costs						
1	Fuel costs	14,000	14,000	14,000	14,000	14,000
2	Lubricant/Oil Costs	50,000	50,000	60,000	65,000	50,000
3	Anchorage service fee	100,000	100,000	100,000	100,000	100,000
4	Passenger fresh water charges	0	0	0	0	0
Overhead costs						
		0	0	0	0	0
Annual maintenance costs						
		10,000,000	8,000,000	8,100,000	9,500,000	9,500,000

Every day, five longboats with a capacity of 28 passengers travel the Palembang-Line 8 route. Traveling 45 kilometers takes approximately 2.8 hours at an average speed of 16 kilometers per hour. The fare per person is Rp 85,000. The calculation includes all variables based on the tariff formulation in accordance with PM 61 of 2021, and yields the following results:

Table 3. Tariff Calculation Results (IDR.)

No	Ship Name	Existing Tariffs	VOC/km rate	VOC rate (within 45km)	Tariff difference
1	Giri Indah	85,000	1,006	45,270	39,730
2	Amora	85,000	1,042	46,890	38,110
3	Haras Grup 1	85,000	1,028	46,260	38,740
4	Haras Grup 2	85,000	1,044	46,980	38,020
5	Biru Laut	85,000	1,017	45,765	39,235
	Average		1.027	46,233	38,767

An analysis of longboat fares on the Palembang-Line 8 route reveals crucial insights into passenger perceptions and fare elasticity. The average fare is IDR. 1,027 per kilometer, totaling IDR. 46,233 for a 45 km journey. A significant 57% of passengers consider the current fare of IDR. Eighty-five thousand is too high, and they are unwilling to accept any increase, while only 43% would entertain a rise below 5%. This indicates that the fare is nearing its upper limit, and any increase beyond 5% could severely impact ridership—a 5% increase in IDR. 89,250 is unlikely to attract many customers without demonstrable improvements in service quality.

Furthermore, a 10% hike could drive 64% of passengers to seek alternatives, underscoring strong price sensitivity with an elasticity of 6.4, and maintaining the fare at IDR. 85,000 is essential, as it exceeds the variable operating cost of IDR. 38,767 per passenger, ensuring profitability. The significant willingness to pay highlights the fundamental nature of longboat transport for those living along the riverbanks. Research consistently shows that fare discounts can effectively boost demand, as seen in Geneva. Strategic regulations and subsidies are also vital to enhance public transport usage. A thorough analysis of subsidy mechanisms will provide the necessary insights to shape future tariffs and optimize service effectiveness.

Table 4. shows the results of the subsidy rate calculations (In IDR.)

No	Ship Name	Existing Tariffs	Subsidy	Subsidy Rates
1	Giri Indah	85,000	9,051	75,949
2	Amora	85,000	9,230	75,770
3	Haras Grup 1	85,000	9,380	75,620
4	Haras Grup 2	85,000	9,393	75,608
5	Biru Laut	85,000	9,156	75,844
Average			9,242	75,758

The average fare subsidy for longboats on the Palembang-Route 8 is IDR. 9,242 per passenger, effectively lowering the fare to IDR. 75,758 for each of the 28 passengers. This amounts to a substantial average trip subsidy of IDR. 258,776. This subsidy not only reduces costs for users but also has the potential to increase demand significantly, demonstrating the government's strong commitment to securing the funds needed for sustainable river transportation through strategic budget allocation. By using VOC data to compare the willingness-to-pay (WTP) curve with the demand curve, we can improve market dynamics and create a more effective community transportation network.

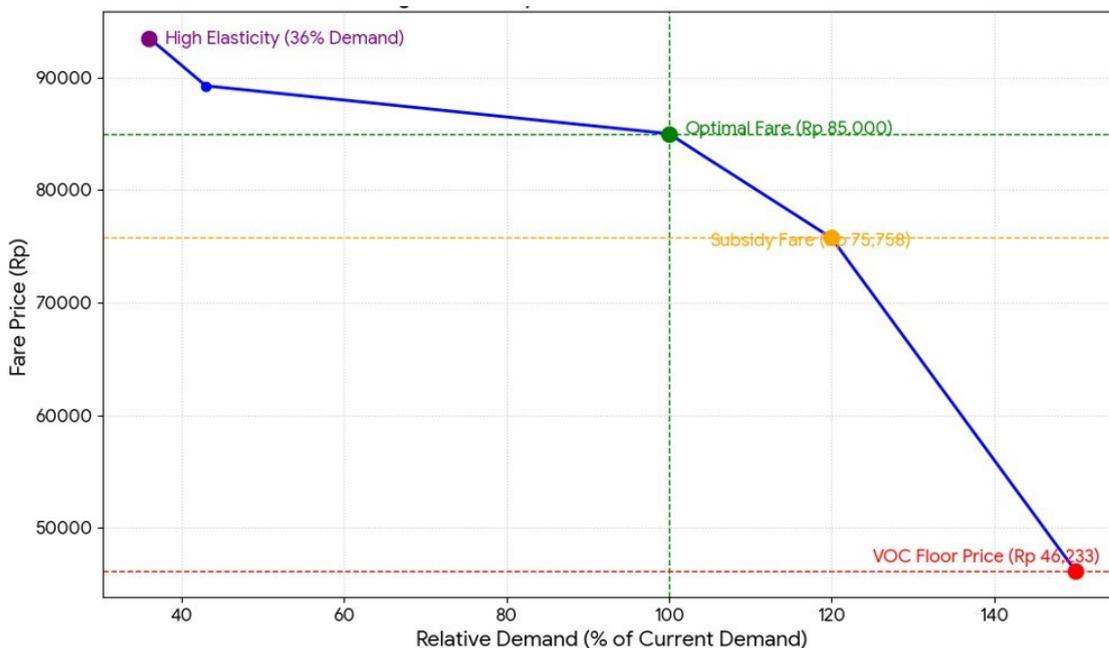


Figure 3 Willingness to pay curve versus relative demand

The curve illustrates the relationship between fare prices and demand, measured by the number of passengers. The optimal fare is the price at which passengers' willingness to pay (WTP) equals 100% of demand. Prices below the value of consumer (VOC) can lead to operational losses, while demand can peak at 150%. A mere 10% fare increase drastically reduces demand to 36%, highlighting the price sensitivity of longboat services. Conversely, lowering fares could increase demand by up to 120%, aligning with public transportation subsidy goals. This emphasizes the need for operators to set fares at the WTP limit; any price hike without improved service quality risks losing passengers.

DISCUSSION

Linear regression analysis revealed that passengers' WTP sensitivity was significantly influenced by shore employee costs (X4, X5, X6), an unusual finding indicating that the ship's non-core operational costs weigh most heavily on public fare perceptions. This phenomenon, coupled with the price elasticity of 6.4. reinforces the conclusion that IDR 85,000 is the highest level tolerated by key user demographics (women, traders, and middle-income earners). A serious gap exists because passengers perceive the fare as disproportionate to service quality (safety, punctuality, and comfort), even though operators record significant profits despite a much lower VOC per passenger (IDR 46,233). This situation creates a moral hazard risk for operators that is, the potential to maintain high fares while neglecting quality improvements.

To address operational risks and maintain the continuity of this essential service, it is recommended that regulators immediately take two strategic steps: fare stability and strengthened subsidies. Price increases should be prohibited, and instead, a subsidy of IDR 9,242 per passenger should be implemented to lower the effective fare to approximately IDR 46,233, which has been shown to increase demand by up to 120%. This subsidy measure must be tied to strict minimum service performance standards (particularly on safety and punctuality) to close the value-perception gap. Furthermore, modal integration with public transportation is needed to facilitate onward travel for users, making longboats an integral part of Palembang's public transportation system.

CONCLUSION

Based on the results of the Vehicle Operating Cost (VOC) and Willingness to Pay (WTP) analysis conducted in the tariff optimization study, several important findings can be identified regarding the determination of river transportation fares on the Palembang–Line 8 route. The analysis indicates that the transportation fare is influenced by several operational cost components, particularly shore employee salary costs, food costs, and equipment costs. These variables significantly affect the fare structure, as reflected in the regression equation $Y=4.235-0.235X_1-0.044X_2+0.156X_3+0.582X_4-0.409X_5+0.318X_6+0.233X_7$ $Y = 4.235 - 0.235X_1 - 0.044X_2 + 0.156X_3 + 0.582X_4 - 0.409X_5 + 0.318X_6 + 0.233X_7$, which illustrates the relationship between operational cost factors and tariff determination.

Furthermore, the calculation of longboat fares using the VOC method resulted in an average operational cost of IDR 1,027 per kilometer for the 45-kilometer Palembang–Line 8 route. Based on this calculation, the estimated transportation fare is approximately IDR 46,233 per passenger. This value reflects the operational cost required to maintain service sustainability while considering the efficiency of transportation operations.

However, the current fare applied to passengers is IDR 85,000, which is significantly higher than the calculated VOC-based fare of approximately IDR 38,767 per passenger. This gap indicates that the existing tariff structure generates relatively high profits for operators. Therefore, a subsidy scheme of IDR 1,027 per kilometer, equivalent to approximately IDR 9,242 per passenger, could be considered as a policy option to reduce passenger fares while maintaining operational feasibility. Implementing such a subsidy scheme has the potential to increase public transportation affordability and stimulate passenger demand, while still complying with public transportation regulations and incentive-based operational principles.

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DECLARATION OF CONFLICTING INTERSETS

I, as a researcher in the study " Longboat Tariff Calculation Optimization", hereby declare that there are no financial conflicts of interest or professional relationships that could influence the objectivity or interpretation of the data presented in this study. This study was conducted independently, and the Author receives no funding or honoraria, nor does he have any shareholdings or other assets directly related to the longboat operators association or government agencies in charge of determining fares and subsidies, ensuring that the results and fare recommendations are entirely based on empirical data on passenger WTP and VOC.

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