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# Load Factor Analysis of KMP Bambit Pioneer Ship to Enhance Maritime Accessibility in Eastern Indonesia's 3T Regions

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**Abstract**

**Background:** The 3T regions in Indonesia (underdeveloped, frontier, and remote areas) are continuously grappling with issues related to maritime connectivity. Ships like KMP Bambit, one of the vessels serving those islands under the government's Sea Toll Program, have helped bridge these gaps but have not been operating efficiently.
**Objective:** This research investigates the load factor analysis of KMP Bambit's Merauke–Atsy–Agats–Senggo route and offers recommendations to optimize ship capacity utilization and service quality.
**Methods:** Quantitative research methods were employed. Operational data were gathered from January 2022 to June 2025, augmented by surveys of sixty-five stakeholders. Capacity utilization was measured using Load Factor Analysis (LFA), and a SWOT analysis was conducted to map both internal and external strategic factors.
**Results:** The average passenger load factor was 42.43%, and the vehicle/freight load factor was 45.14%, both significantly below the Ministry of Transportation's efficiency threshold of 70%. Major barriers include infrequent sailing schedules, inadequate port infrastructure, and seasonality. The SWOT analysis placed KMP Bambit in Quadrant I, suggesting an expansion strategy.
**Conclusion:** This research recommend implementing optimized sailing schedules, needs-based renovation of port facilities, formalization and streamlining of online reservation systems for shipping services, and strengthened government–private sector coordination as measures to improve load factors and achieve economic sustainability in maritime services connecting major urban centers to rural areas across Indonesia's remote South Papua region.

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## INTRODUCTION

Indonesia, which is known as the largest archipelagic country in the world with 17,000 islands, struggles to provide equitable public services for its 3T regions, an abbreviation of *Terdepan* (Frontier), *Terluar* (Outermost), and *Tertinggal* (Left Behind) provinces that have not experienced much development until now (Fauzi et al., 2026; Pambudi & Handayani, 2023). The territorial fragmentation results in significant inequalities in terms of regional growth and the

accessibility of key services, such as health, food availability, and education (Kurniawan et al., 2024; Pratama et al., 2025). Maritime transport is the backbone of connectivity among islands and plays a vital role in the efficient distribution of goods along with population mobility (Akustia et al., 2024). Sea transportation in the 3T regions became more than just a mode of inter-island connectivity but was essential for delivering other necessities, such as medical supplies and equipment needed by communities for their welfare (Nasrullah, 2025). As a result, maritime transport in these areas is part of economic competitiveness and regional stability (Colak et al., 2026; Rezwana et al., 2026; Yuliana et al., 2025).

To remedy these connectivity gaps, the Indonesian government created the Sea Toll Program (*Program Tol Laut*) in 2015 via the Ministry of Transportation. It uses pioneer ships to ply routes that are commercially unviable but strategically vital, providing subsidized sea services for 3T communities (Idris et al., 2025; Verawati, 2022). KMP Bambit is one of 11 vessels operating the Merauke–Atsy–Agats–Senggo route in Merauke Regency, South Papua, with a capacity of 185 passengers and up to 11 vehicles, supporting this primary mode of public transportation along an otherwise underserved corridor (Safitri et al., 2026; Wuryaningrum et al., 2026).

Pioneer vessels play a critical role in enhancing connectivity and moving goods; however, they have chronically poor operational efficiency, especially related to ship capacity utilization (Poulsen et al., 2022). The load factor, expressed as the proportion of capacity actually used compared with capacity available, has been described as an important determinant of ship operational efficiency: high load factors indicate good to optimal utilization of vessel capacity and thus lower per-unit costs (Godet et al., 2024; Tukan et al., 2024). Nonetheless, irregular sailing frequency, under-regulated port infrastructure, and variable seasonal demand are significantly curtailing the load factor of some pioneer vessels (Merkel & Lindgren, 2022; Qu et al., 2024). Studies also support the finding that pioneer ship load factors in Indonesia are persistently low, indicative of capacity inefficiency, which puts pressure on government subsidy expenditure . A deeper analysis is therefore required to determine what affects the load factor of KMP Bambit and to best formulate strategies to increase its operational utilization.

The objectives of this study are therefore to (1) analyze KMP Bambit's passenger and cargo load factor on the Merauke–Atsy–Agats–Senggo route from January 2022 to June 2025; (2) identify key factors affecting capacity utilization; and (3) provide evidence-based strategic recommendations in order to increase ship operational efficiency and service quality for people living in the 3T regions of South Papua. The results will provide valuable insights to inform government policy on maritime transport management, guide fleet optimization, and improve the sustainable economic development of many remote areas.

## METHOD

### Data Types and Sources

This research was a quantitative study drawing data from two main sources. Primary data were obtained from KMP Bambit's official voyage logs documenting its scheduled sailings from January 2022 through June 2025. This information includes the ship's technical specifications (LOA, LBP, B, H, T), declared cargo capacity, and the number of passengers and vehicles carried per voyage. Second, 65 stakeholders (ship service users, ship operators, and local government officers) were interviewed and surveyed in a structured format, constituting the primary data.

### Data Collection Techniques

Data collection was conducted through a combination of semi-structured interviews and structured questionnaires. Interviews were conducted with KMP Bambit operators, local port management authorities, and government officials to capture firsthand information on ship operations, maritime policies, and the associated challenges in service delivery within 3T maritime regions.

Data were also collected by distributing a structured questionnaire to 65 respondents composed of general ship service users, ship operators, and other related stakeholders. A sample size of 65 was computed using the Slovin formula based on a population of 180 individuals (margin of error e = 0.1). Respondents were asked to rate their perceptions of the most important

service dimensions, which included load factor adequacy, facility comfort, sailing schedule reliability, and overall passenger satisfaction. All variables were assessed using a 5-point Likert scale.

**Data Analysis Techniques**

The data collected from surveys and interviews were analyzed using two major techniques:

1. Load Factor Analysis: In this stage, researchers collected data for calculating *KMP* Bambit's Load Factor (LF), defined as the ratio of used capacity to available capacity. The Load Factor is calculated using the formula:

$$Load\ Factor\ (LF) = \frac{\text{Used Capacity}}{\text{Available Capacity}} \times 100\%$$

   To calculate available capacity, researchers used KMP Bambit's Ship Particulars, which include vessel dimensions, car deck capacity, and cargo space. The procedure for determining available capacity involves obtaining the Ship Particulars, identifying the car deck capacity, the number of passenger seats or berths, and the cargo space capacity. Meanwhile, KMP Bambit's previous cargo records provided data on used capacity. All passenger and cargo data were analyzed and compiled by route, which determined the used capacity. Lastly, the Load Factor was defined as the ratio of used capacity to available capacity (Chen et al., 2025).
2. A SWOT analysis was then applied to assess both the internal and external strategic factors regarding *KMP* Bambit's operational performance on the Merauke–Atsy–Agats–Senggo route. Internal factors assessed consisted of vessel condition, facility quality, and operational management capacity; external factors were those associated with government policy frameworks, port infrastructure conditions, and seasonal variability in demand. The results from the SWOT matrix were applied to strategic positioning, classified as either aggressive (Quadrant I), diversification (Quadrant II), turnaround (Quadrant III), or defensive (Quadrant IV), which helped formulate appropriate action strategies (Aly et al., 2025).

This study combines the load factor analysis with the SWOT results and provides a comprehensive set of recommendations on capacity utilization to improve the operational efficiency of pioneer vessels, particularly on the Merauke–Atsy–Agats–Senggo route.

## RESULTS AND DISCUSSION

### Results

**Research Location Overview**

Merauke is a regency at the southeastern extreme of Papua Province, Indonesia, and borders Papua New Guinea. The region spans 46,791.63 km$^2$ and encompasses 20 districts, with a variety of geographic conditions that include lowland areas as well as swamps, tidal floodplains, and tropical coastal habitats.

The geographical conditions in Merauke present fundamental transportation challenges, especially for connecting outlying and remote hinterlands to the center of regional government. With very little land infrastructure and many areas being "impassable," especially during the rainy season, sea transportation is critical it is the only form of transport available for people and goods.

KMP Bambit is known as one of the first vessels serving the main routes from Merauke to areas such as Atsy, Agats, and Senggo. As such, this vessel is key in supporting goods distribution and mobility among communities that rely on it, especially those in 3T regions that cannot be easily reached by other means of transportation. Because the vessel may not have sufficient capacity to serve the region's connectivity demands, a load factor analysis is essential for assessing whether it uses its capacity efficiently and whether adjustments can be made to achieve productivity improvements.

**Research Data**

Passenger and Cargo Load Factor

Tabel 1 presents KMP Bambit service data for the period January 2022 to June 2025.

**Table 1.** KMP Bambit Service Data for the Period January 2022 – June 2025

| No. | Period | Cargo Type | | |
|---|---|---|---|---|
| | | Passengers | Vehicles ($m^2$) | Freight ($m^2$x 1 m) |
| 1 | January 2022 | 164 | 4 x 6,57 = 26,28 | 160 |
| 2 | February 2022 | 143 | 3 x 6,57 = 19,71 | 150 |
| 3 | March 2022 | 160 | 3 x 6,57 = 19,71 | 183 |
| 4 | April 2022 | 147 | 3 x 6,57 = 19,71 | 175 |
| 5 | May 2022 | 154 | 3 x 6,57 = 19,71 | 170 |
| 6 | June 2022 | 153 | 3 x 6,57 = 19,71 | 151 |
| 7 | July 2022 | 160 | 3 x 6,57 = 19,71 | 180 |
| 8 | August 2022 | 165 | 3 x 6,57 = 19,71 | 190 |
| 9 | September 2022 | 145 | 3 x 6,57 = 19,71 | 205 |
| 10 | October 2022 | 150 | 3 x 6,57 = 19,71 | 183 |
| 11 | November 2022 | 140 | 3 x 6,57 = 19,71 | 235 |
| 12 | December 2022 | 162 | 3 x 6,57 = 19,71 | 215 |
| | TOTAL | 1843 | 37x6,57 = 243,09 | 2197 |
| 1 | January 2023 | 172 | 4 x 6,57 = 26,28 | 160 |
| 2 | February 2023 | 160 | 4 x 6,57 = 26,28 | 150 |
| 3 | March 2023 | 155 | 5 x 6,57 = 32,85 | 183 |
| 4 | April 2023 | dock | dock | dock |
| 5 | May 2023 | dock | dock | dock |
| 6 | June 2023 | 155 | 5 x 6,57 = 32,85 | 151 |
| 7 | July 2023 | 168 | 4 x 6,57 = 26,28 | 180 |
| 8 | August 2023 | 165 | 4 x 6,57 = 26,28 | 190 |
| 9 | September 2023 | 161 | 4 x 6,57 = 26,28 | 205 |
| 10 | October 2023 | 150 | 4 x 6,57 = 26,28 | 180 |
| 11 | November 2023 | 166 | 6 x 6,57 = 39,42 | 245 |
| 12 | December 2023 | 157 | 7 x 6,57 = 45,99 | 230 |
| | TOTAL | 1609 | 47x6,57=308,79 | 1874 |
| 1 | January 2024 | 164 | 7 x 6,57 = 45,99 | 230 |
| 2 | February 2024 | 143 | 7 x 6,57 = 45,99 | 200 |
| 3 | March 2024 | 160 | 7 x 6,57 = 45,99 | 235 |
| 4 | April 2024 | 147 | 7 x 6,57 = 45,99 | 230 |
| 5 | May 2024 | 154 | 7 x 6,57 = 45,99 | 230 |
| 6 | June 2024 | 153 | 7 x 6,57 = 45,99 | 230 |
| 7 | July 2024 | 160 | 7 x 6,57 = 45,99 | 230 |
| 8 | August 2024 | 165 | 8 x 6,57 = 52,56 | 230 |
| 9 | September 2024 | 145 | 7 x 6,57 = 45,99 | 232 |
| 10 | October 2024 | 150 | 8 x 6,57 = 52,56 | 250 |
| 11 | November 2024 | 140 | 8 x 6,57 = 52,56 | 280 |
| 12 | December 2024 | 162 | 9 x 6,57 = 59,13 | 275 |
| | TOTAL | 1843 | 89x6,57=584,73 | 2852 |
| 1 | January 2025 | 172 | 8 x 6,57 = 52,56 | 250 |
| 2 | February 2025 | 166 | 8 x 6,57 = 52,56 | 247 |
| 3 | March 2025 | 160 | 9 x 6,57 = 59,13 | 235 |
| 4 | April 2025 | 165 | 9 x 6,57 = 59,13 | 248 |
| 5 | May 2025 | dock | dock | dock |
| 6 | June 2025 | dock | dock | Dock |

| No. | Period | Cargo Type | | |
|---|---|---|---|---|
| | | Passengers | Vehicles ($m^2$) | Freight ($m^2$x 1 m) |
| | | 663 | 34x6,57=223,38 | 980 |

Source: Research Data 2025

As the load factor is one of the most important aspects that represent how well it is utilizing capacity, from Tables 2 and 3 we can see *KMP Bambit*'s utilization capacity still remains significantly far below the optimal level during the period of this study. The key findings for passenger and cargo load factors are summarized into:

1. Passenger Load Factor: For the entire study period, the average passenger load factor was 42.43%, meaning approximately 42% of available capacity (passenger × mile) on a given trip was utilized. The passenger load factor fell short of the Ministry of Transportation's 70% minimum efficiency target during every period examined.
2. Vehicle and Freight Load Factor: The vehicle and freight load factor reached an average of 45.14% (slightly larger than the passenger load factor), still far below the 70% efficiency target. Moreover, a significant increase can be spotted from 2023, where cargo load factors neared 56–62%, with record highs observed in late 2024 and early 2025 in total cargo traveling on this route.

**Table 2.** Load Factor Values for KMP Bambit Passenger Load for the Period January 2022–June 2025

| Period | Installed Load Capacity | Actual Passengers | Value of Load Factor (LF) % |
|---|---|---|---|
| January 2022 | 185 x 2 trip = 370 | 164 | 44, 32 |
| February 2022 | 185 x 2 trip = 370 | 143 | 38,65 |
| March 2022 | 185 x 2 trip = 370 | 160 | 43,24 |
| April 2022 | 185 x 2 trip = 370 | 147 | 39,73 |
| May 2022 | 185 x 2 trip = 370 | 154 | 41,62 |
| June 2022 | 185 x 2 trip = 370 | 153 | 41,35 |
| July 2022 | 185 x 2 trip = 370 | 160 | 43,24 |
| August 2022 | 185 x 2 trip = 370 | 165 | 44,59 |
| September 2022 | 185 x 2 trip = 370 | 145 | 39,19 |
| October 2022 | 185 x 2 trip = 370 | 150 | 40,54 |
| November 2022 | 185 x 2 trip = 370 | 140 | 37,84 |
| December 2022 | 185 x 2 trip = 370 | 162 | 43,78 |
| January 2023 | 185 x 2 trip = 370 | 170 | 45,94 |
| February 2023 | 185 x 2 trip = 370 | 160 | 43,24 |
| March 2023 | 185 x 2 trip = 370 | 155 | 41,89 |
| June 2023 | 185 x 2 trip = 370 | 155 | 41,89 |
| July 2023 | 185 x 2 trip = 370 | 168 | 45,41 |
| August 2023 | 185 x 2 trip = 370 | 165 | 44,59 |
| September 2023 | 185 x 2 trip = 370 | 161 | 43,51 |
| October 2023 | 185 x 2 trip = 370 | 150 | 40,54 |
| November 2023 | 185 x 2 trip = 370 | 166 | 44,86 |
| December 2023 | 185 x 2 trip = 370 | 157 | 42,43 |
| January 2024 | 185 x 2 trip = 370 | 164 | 44,32 |
| February 2024 | 185 x 2 trip = 370 | 143 | 38,65 |
| March 2024 | 185 x 2 trip = 370 | 160 | 43,24 |
| April 2024 | 185 x 2 trip = 370 | 147 | 39,73 |
| May 2024 | 185 x 2 trip = 370 | 154 | 41,62 |
| June 2024 | 185 x 2 trip = 370 | 153 | 41,35 |
| July 2024 | 185 x 2 trip = 370 | 160 | 43,24 |

| Period | Installed Load Capacity | Actual Passengers | Value of Load Factor (LF) % |
|---|---|---|---|
| August 2024 | 185 x 2 trip = 370 | 165 | 44,59 |
| September 2024 | 185 x 2 trip = 370 | 145 | 39,19 |
| October 2024 | 185 x 2 trip = 370 | 150 | 40,54 |
| November 2024 | 185 x 2 trip = 370 | 143 | 38,65 |
| December 2024 | 185 x 2 trip = 370 | 162 | 43,78 |
| January 2025 | 185 x 2 trip = 370 | 172 | 46,49 |
| February 2025 | 185 x 2 trip = 370 | 166 | 44,86 |
| March 2025 | 185 x 2 trip = 370 | 160 | 43,24 |
| April 2025 | 185 x 2 trip = 370 | 165 | 44,59 |
| ***Average Value of Load Factor*** | | | 42,427 |

Source: Research Data 2025

**Table 3.** Load Factor Values for Vehicle and Goods Loads on the KMP Bambit January 2022–June 2025

| Period | Installed Load Capacity | Actual Vehicle And Freight Load (m2) | Value of Load Factor (LF) % |
|---|---|---|---|
| January 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 186.28 | 34.4963 |
| February 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 169.71 | 31.42778 |
| March 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 202.71 | 37.53889 |
| April 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 194.71 | 36.05741 |
| May 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 89.71 | 35.13148 |
| June 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 170.71 | 31.61296 |
| July 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 199.71 | 36.98333 |
| August 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 209.71 | 38.83519 |
| September 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 224.71 | 41.61296 |
| October 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 202.71 | 37.53889 |
| November 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 254.71 | 47.16852 |
| December 2022 | 270 $m^2$ x 2 trip = 540 $m^2$ | 234.71 | 43.46481 |
| January 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 186.28 | 34.4963 |
| February 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 176.28 | 32.64444 |
| March 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 215.85 | 39.97222 |
| June 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 183.85 | 34.0463 |
| July 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 206.28 | 38.2 |
| August 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 216.28 | 40.05185 |
| September 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 231.28 | 42.82963 |
| October 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 206.28 | 38.2 |
| November 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 284.42 | 52.67037 |
| December 2023 | 270 $m^2$ x 2 trip = 540 $m^2$ | 275.99 | 51.10926 |
| January 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 275.99 | 51.10926 |
| February 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 245.99 | 45.5537 |
| March 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 280.99 | 52.03519 |
| April 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 275.99 | 51.10926 |
| May 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 275.99 | 51.10926 |
| June 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 275.99 | 51.10926 |
| July 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 275.99 | 51.10926 |
| August 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 282.56 | 52.32593 |
| September 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 277.99 | 51.47963 |
| October 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 302.56 | 56.02963 |
| November 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 332.56 | 61.58519 |
| December 2024 | 270 $m^2$ x 2 trip = 540 $m^2$ | 334.13 | 61.87593 |

| Period | Installed Load Capacity | Actual Vehicle And Freight Load (m2) | Value of Load Factor (LF) % |
|---|---|---|---|
| January 2025 | 270 $m^2$ x 2 trip = 540 $m^2$ | 302.56 | 56.02963 |
| February 2025 | 270 $m^2$ x 2 trip = 540 $m^2$ | 299.56 | 55.47407 |
| March 2025 | 270 $m^2$ x 2 trip = 540 $m^2$ | 294.13 | 54.46852 |
| April 2025 | 270 $m^2$ x 2 trip = 540 $m^2$ | 307.13 | 56.87593 |
| ***Average Value of Load Factor*** | | | 45,141 |

Source: Research Data 2025

The load factors fall below the 70% minimum efficiency standard threshold, which designates whether or not shipping operations are economically viable and able to operate without a high reliance on government subsidies, as established by the Indonesian Ministry of Transportation. Comparing the maximum available capacity versus actual utilization also proved that *KMP Bambit* has always remained below optimal performance. Continued underutilization of installed capacity (versus actual load levels) constitutes operational expenditures not proportionately covered by revenues in the form of ticket and cargo receipts (fuel, crew, and port costs).

**Load Factor Analysis and Influencing Factors**

The results of the analysis show that the load factor has not reached an optimal target for both passengers and cargo, which means *KMP Bambit* is still experiencing low utilization. There are several reasons responsible for this result:

1. Irregularity of Sailing: Unpredictable sailing schedules reduce public trust in ship services and translate into a decline in passenger and cargo bookings. When schedules do not match up with community needs most acutely around agricultural or harvest seasons vessels leave port under-occupied, directly suppressing the load factor.
2. Port Infrastructure Conditions: The lack of adequate loading, unloading, and other port infrastructure at 3T region ports makes it difficult to operate at maximum efficiency, resulting in lengthy vessel waiting times that discourage many cargo shipments. Poor pier standards also reduce vessel turnaround times and accessibility for higher volumes of cargo, leading to low freight load factors.
3. Variability of Demand by Season: The demand for maritime transport is highly seasonal. Peak periods (the harvest season, *Eid ul-Fitr*, and Christmas) have high load factors, whereas off-peak periods have very low utilization. So while load factors can reach usual levels during peak periods, the seasonality of regional demand makes it difficult for operators to optimize capacity and schedules consistently over time.

**Strategies to Increase Ship Capacity Utilization and Improve Service**

*KMP Bambit*'s operational conditions can still be modified strategically to achieve maximum utilization. Based on the load factor analysis, *KMP Bambit* could still employ targeted strategies to enhance passenger and cargo transport capacity. A SWOT analysis was performed to develop improvement strategies (n = 65). The IFAS recorded 2.104 for strengths and 1.774 for weaknesses, producing an X-coordinate (IFAS) of 0.33 (Prajogo & Sohal, 2006). The External Factors Analysis Summary (EFAS) scored opportunities at 2.121 and threats at 2.06, for a Y-coordinate (EFAS) score of 0.061.

With this IFAS and EFAS positioning, *KMP Bambit* is placed in Quadrant I of the SWOT diagram (Figure 1), indicating that a growth-oriented (aggressive) strategy would be appropriate. This positioning indicates the ship has sufficient internal capabilities to take advantage of available external opportunities in support of a growing and improved service approach.

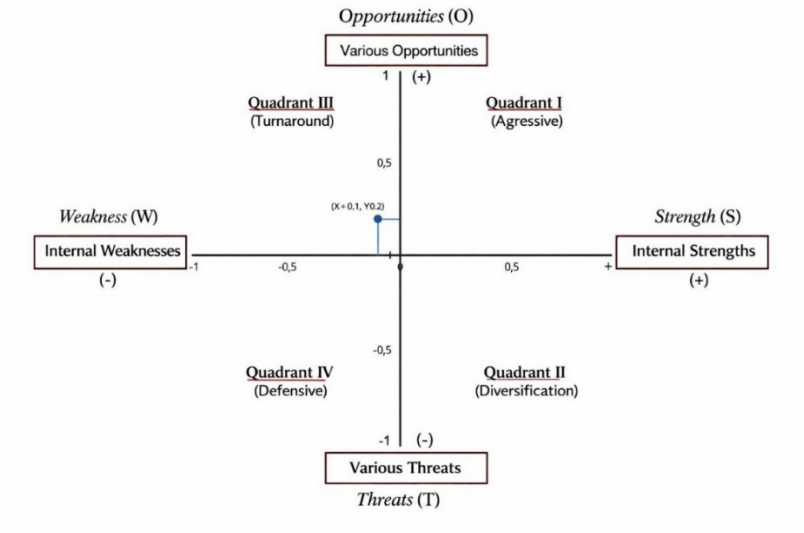


**Figure 1**. Positioning in SWOT Analysis
Source: Research Data 2025

This positioning of KMP Bambit in Quadrant I (Figure 1) negates a cautious expansion strategy. In this context, it entails capitalizing upon legacy operational advantages primarily government subsidies, long tourism routes, and reputable operations to take full advantage of growth opportunities as they materialize, such as growing cargo volumes and investments in port infrastructure and digital services. The specific action strategies are shown in Table 4.

**Table 4**. SWOT Matrix of Action Strategies for Improving Sea Transportation Services By KMP Bambit on the Merauke-Atsy-Agats-Atsy-Senggo-Atsy-Merauke Route

| | ***Strenghts*** | ***Weaknesses*** |
|---|---|---|
| | 1. What do you think about the KMP Bambit's relatively punctual departure and arrival schedules?<br>2. Do you think the frequency of KMP Bambit's voyages on the Merauke-Atsy-Agats-Senggo route is regular and meets needs?<br>3. Do you think the KMP Bambit's passenger and cargo capacity is adequate compared to other modes of transportation?<br>4. Do you think the KMP Bambit's crew are experienced and able to interact well with passengers?<br>5. Do you think the KMP Bambit's ticket prices are affordable compared to alternative transportation options? | 1. How comfortable are the ship's facilities, such as seating, restrooms, and restrooms, in your opinion?<br>2. How comfortable is the ship's cleanliness throughout the voyage?<br>3. How efficient is the fuel usage of the KMP. Bambit, ensuring it doesn't burden operational costs?<br>4. How do you feel about the number of trips the KMP. Bambit takes, even if it's affected by technical and weather factors?<br>5. How do you feel about the number of trips the KMP. Bambit takes, even if it's affected by technical and weather factors? |
| ***Opportunity*** | **S-O Strategy** | **W-O Strategy** |
| 1. What do you think about the increasing public | 1. SO1: Improve the consistency of schedule | 1. WO1: Renovate and modernize ship facilities |

| | | |
|---|---|---|
| demand for sea transportation on this route?<br>2. How do you think government support (such as maritime tolls and subsidies) will help sustain sea transportation services?<br>3. How do you think ship modernization has the potential to improve comfort, safety, and cleanliness of services?<br>4. How do you think service diversification (logistics transportation, additional services) can increase KMP Bambit's revenue?<br>5. How do you think the government's improvements to the dock infrastructure will improve passenger accessibility? | accuracy and develop a digital schedule information system (app/website) to facilitate public access to departure and arrival information.<br>2. SO2: Increase the frequency of sailings during peak seasons by utilizing government subsidies, so that services are more responsive to public needs.<br>3. SO3: Optimize ship capacity with modernized facilities (refrigeration, seating, and cargo security) to ensure the comfort and safety of passengers and cargo.<br>4. SO4: Improve human resource-based services with hospitality training and expand services (e.g., logistics and express delivery) to increase non-ticket revenue.<br>5. SO5: Integrate affordable ticket services with improved dock access, while developing an online reservation system to facilitate ticket purchases for prospective passengers. | (hygienic toilets, ergonomic seats, and proper rest areas) by taking advantage of government support for modernization programs.<br>2. WO2: Develop standard operating procedures (SOPs) for ship cleanliness based on modern standards and involve specialized cleaning service personnel to meet the growing needs of passengers.<br>3. WO3: Optimize fuel efficiency through routine engine maintenance and utilize fuel subsidies/sea tolls to reduce operational costs.<br>4. WO4: Adjust departure schedules with the support of new dock infrastructure, ensuring more consistent trips despite weather/technical constraints.<br>5. WO5: Gradually increase trip frequency while adding logistics and additional services to cover operational costs from increased frequency. |
| **Threat** | **S-T Strategy** | **W-T Strategy** |
| 1. What do you think if it's said that extreme weather often hinders KMP Bambit's voyages?<br>2. What do you think if it's said that the ship's technical condition requires intensive and expensive maintenance?<br>3. What do you think if it's said that the number and skills of human resources (crew and ground staff) are still limited?<br>4. What do you think if it's said that competition with other modes of transportation (communal ships, | 1. ST1: Provide a real-time digital information system (SMS/WhatsApp group/website) regarding departure schedule updates to ensure passenger confidence, even in the event of weather delays.<br>2. Develop flexible schedules (peak and low seasons) to maintain operational efficiency without compromising service reliability.<br>3. Optimize logistics services (transporting large quantities of goods at competitive prices) as an | 1. WT1: Undertake simple renovations to seats, restrooms, and restrooms, and establish daily cleaning SOPs. This will improve passenger comfort and provide an advantage over other modes of transportation.<br>2. WT2: Implement a preventive maintenance program for ship engines and equipment to maintain fuel efficiency, thereby managing operational costs even though extreme weather often extends sailing times.<br>3. WT3: Create an adaptive sailing schedule that takes into account |

| | | |
|---|---|---|
| speedboats, land routes) is quite intense?<br>5. What do you think if it's said that the number of passengers and cargo tends to fluctuate depending on the season or community activities? | advantage over speedboats or smaller public vessels.<br>4. Implement regular crew training and a crew rotation system to maintain excellent service despite limited human resources.<br>5. Implement operational cost efficiency through an online ticketing system and transparent management to maintain affordable prices without compromising ship maintenance costs. | seasonal/weather conditions and community needs. This strategy reduces the risk of cancellations due to technical/weather factors while maintaining passenger confidence.<br>4. WT4: Conduct regular training on safety, customer service, and technical skills to reduce dependence on limited human resources and strengthen competitiveness with other modes of transportation.<br>5. WT5: Provide additional services such as express cargo or distribution partnerships with local businesses, thereby mitigating the impact of passenger fluctuations and expanding the service user base. |

Source: Research Data 2025

Based on the findings of the SWOT analysis in Table 4, integrated strategies to improve KMP Bambit's operating efficiency and load factor are; (1) Scheduling Optimization: Flexible sailing schedules designed around actual community activity patterns or seasonal demand cycles can prevent capacity waste during low-demand periods. Using digital platforms (mobile applications, WhatsApp groups, and official websites) will improve public access to real-time schedule information and advance booking rates, directly contributing to improved load factor. (2) Facility Modernization: Improving the quality of onboard facilities such as clean restrooms, comfortable seating and resting areas, and safe stowage of cargo improves passenger experience and attracts more ridership during off-peak periods. Upgraded facilities also allow for competitive differentiation from competing transport modes (e.g., speedboats or communal vessels), assisting in more stable capacity utilization. (3) Online Booking System: A digital ticketing and cargo reservation system allows operators to track demand in real time and plan voyages accordingly. With pre-boarding data, operators can quickly adapt their schedules while reducing no-shows for passengers and cargo slots alike, leading to more consistently improved load factors. (4) Coordination Between the Government and Private Sector: Strengthening coordination among ship operators, the Ministry of Transportation, local governments, and national logistics partners will increase shipping frequency, port capacity, and the competitiveness of tariff structures. Enhanced integration between logistics service providers and express cargo programs through public-private partnerships may attract greater total cargo volumes. By implementing these strategies in an integrated manner, it is expected that KMP Bambit will gradually increase its load factor until it reaches the 70% efficiency target, improve service quality to 3T communities in South Papua, and contribute to sustainable maritime connectivity in Eastern Indonesia.

## CONCLUSION

This study concludes that the rate of utilization of KMP Bambit on the Merauke–Atsy–Agats–Senggo route has not yet reached 70%, which is the efficiency benchmark established by the Ministry of Transportation. The average passenger load factor of 42.43% and vehicle/freight load factor of 45.14% illustrate the ship's chronic underutilization, leading to significant operational inefficiencies

and an excessive reliance on government subsidies. This poor load factor can be attributed to uncertain sailing schedules, insufficient port infrastructure, and seasonal demand variations.

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**AUTHOR CONTRIBUTION STATEMENT**

Rusnaedi participated in study conceptualization, research design, data interpretation, and manuscript supervision. Andi Ningrat assisted on the methodology development, load factor analysis and validation of operational data. Muslihati helped collect data and performed interviews with stakeholders as well as literature review. SWOT analysis, discussion development and strategic recommendation formulation were assisted by Andi Rachmianty. Rifkah Fitriah was responsible for manuscript drafting, reference management, editing, and final proofreading. All authors reviewed and approved the final version of manuscript.

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