



ANALYSIS OF PERFORMANCE IMPROVEMENT AT THE AMBARITA FERRY PORT IN SAMOSIR REGENCY

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Abstract

Optimal port performance can only be achieved through the support of facilities, human resources, and service systems that meet the needs of port service. The Ambarita Ferry Port is a strategic transportation hub in Samosir Regency that serves the Ambarita–Ajibata route, which has experienced significant growth in recent years. During the 2020–2024 period, the number of passengers increased by 117.61% and vehicles by 73.36%. However, this growth has not been matched by adequate service facilities, such as limited waiting areas, inadequate safety facilities, limited access to information, and the absence of a port zoning system. In this research, an in-depth analysis is carried out to understand the effectiveness of the service and develop strategies to enhance the performance of the port. The results of the performance evaluation indicate that there is still a gap between The importance and performance of the service. An assessment using The Importance Performance Analysis (IPA) method is used to assess the relative importance of factors in a given context indicates that the overall service performance conformity level is 59.33%, falling into the moderate category, with some service indicators in quadrants I to IV. Recommendations for improvement include the provision of protective facilities (signage), service information (maps/facility locations, fares, and onward transportation), and the reorganization of parking areas and terminals. The five-year demand projection (2025–2029) is estimated to reach 1,070,144 passengers and 213,532 mixed vehicles.

Keywords: Port Performance; Importance Performance Analysis; Z; Service Facilities

1. Introduction

A ferry port is a transportation hub that serves the movement of passengers and vehicles between regions via waterways. Ferry ports are important in this regard transportation system by supporting connectivity between regions, especially archipelagic regions, and facilitating the mobility of people and goods.²

Ambarita Ferry Port is located in Samosir Regency, North Sumatra, and serves as an important access point for passenger and vehicle transportation to and from Samosir Island via Lake Toba. The significant increase in vehicle and passenger traffic each year demonstrates that this port is considered a key contributor to the advancement of local economic growth and the tourism sector in the Lake Toba region.³

The Ambarita Ferry Port is included in the national super-priority area with the Ambarita - Ajibata route taking approximately 60 minutes and served by two ships, namely KMP. Ihan Batak & KMP. Pora-Pora. Based on data from the past five years (2020–2024), there has been a

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² Nurlisa Ginting et al., "Self-Efficacy on Accessibility for Sustainable Tourism in Pangururan District, Samosir Regency, Indonesia," *E3S Web of Conferences* 519 (2024): 1–7, <https://doi.org/10.1051/e3sconf/202451903026>.

³ Siti Hajar, . Ramlan, and Nur Ambia Arma, "Tourism Governance Based-On Penta-Helix Model in Samosir Island, Indonesia," *International Journal of Religion* 5, no. 11 (2024): 1914–27, <https://doi.org/10.61707/rjw9gt07>.



growing trend in the number of individuals and vehicles utilizing the service at the port. The number of passengers increased from 277,383 in 2020 to 603,617 in 2024, while the number of vehicles rose from 60,399 to 104,715. Overall, the percentage increase in passengers reached 117.61%, with an average annual increase of 29.41%, while vehicles increased by 73.36% with an average increase of 18.34%. This growth indicates a need for improved port services and capacity.

This study focuses on improving the operational efficiency of the Ambarita Ferry Port, with the following issues identified: Passengers waiting around the passenger terminal, The absence of designated parking led to random placement of two-wheeled vehicles, accompanied by the presence of tollgate and weighbridge facilities, but the weighbridge facilities are not yet available, and the unavailability of facilities such as evacuation route signs, evacuation assembly points, wheelchairs, dedicated spaces for people with disabilities, lactation rooms, inadequate first aid supplies, fire extinguishers, and poor toilet hygiene indicate that service aspects are not fully meeting performance standards.

Therefore this research is essential in offering a comprehensive overview of efforts to improve the performance of Ambarita Ferry Port based on growth in demand and service facility requirements. Ambarita Port was chosen as the case study location because, in recent five-year trends, it has experienced a considerable upward trend in the count of passengers and vehicles, but this has not been matched by adequate facilities. Additionally, the selection of this location aims to assess the extent to which the port is prepared to meet the needs of service users. The findings of this research are intended to form the foundation for delivering recommendations for comprehensive improvements to port performance.

2. Research Method

This study uses a mixed-method strategy that utilizes both quantitative and qualitative techniques for data gathering. The approach to collecting data in this research are grouped into Both secondary and primary data were utilized. Primary data refers to information obtained firsthand from original sources through field observation activities.⁴ The observation method is used as a way to obtain data directly in order to gain deeper insight by going directly to the field. The aim is to gain a more holistic view.⁵ The information obtained through observation was then recorded and used as material for analysis to understand the issues that could be identified accurately. The data collection process in this study was conducted using various instruments according to the type of data required.⁶ Details of the data collection methods and procedures are as follows: assessment of passenger, vehicle, and ship satisfaction; ship maneuvering time; number and time of vehicles boarding/disembarking ships; the duration vehicles wait before boarding the vessel; assessment of facility availability and service standards; parking data within the designated drop-off and pick-up zone; and passenger and vehicle service satisfaction.

Secondary data is data obtained from written reports and observations from several sources. In

⁴ Turah Suhono and Hanif Al Fatta, "PENYUSUNAN DATA PRIMER SEBAGAI DASAR INTEROPERABILITAS SISTEM INFORMASI PADA PEMERINTAH DAERAH MENGGUNAKAN DIAGRAM RACI (Studi Kasus: Pemerintah Kabupaten Purworejo)," *Jnanaloka*, 2021, 35–44, <https://doi.org/10.36802/jnanaloka.2021.v2-no1-35-44>.

⁵ Annisa Rizky Fadilla and Putri Ayu Wulandari, "Literature Review Analisis Data Kualitatif: Tahap Pengumpulan," *Mitita Jurnal Penelitian* 1, no. No 3 (2023): 34–46.

⁶ Jimmy Ebong, "A Qualitative Analysis of Service Experience, Perceptions of Service Quality and Service Management," 2017, <https://doi.org/10.1504/IJQRS.2017.10009117>.



collecting secondary data, several methods are used, namely: Literature Review Method, in which literature is used, as well as studying course modules containing theories relevant to the research topic to deepen understanding and support the analysis conducted. These theories can serve as a foundation for analyzing problems and their alternative solutions.⁷

Performance evaluation of ferry ports based on indicators referring to regulation No. KP-DRJD 539/2022 of the Director General of Land Transportation consists of performance components related to services, operations, and supporting facilities.⁸ Performance evaluation is also conducted based on respondents' assessments of passenger and vehicle service performance, which will be analyzed adopting the IPA (Importance-Performance Analysis) method.

Planning to Improve Services to Meet Future Passenger and Vehicle Needs (forecasting), Planning to improve services to accommodate future passenger and vehicle demand, Analysis of Passenger and Vehicle Demand Using Linear Regression Analysis with the X variable representing future time, processed using the Least Squares Method to generate forecast data with the smallest possible squared error (minimum). The resulting equation is as follows:

$$Y = a + bx$$

Where:

Y = Dependent variable

X = Independent variable

A = Intercept or regression constant

B = Regression coefficient

3. Results and Discussion

a. Evaluation of Performance in Terms of Service, Operational, and Supporting Aspects

Port performance assessments are accumulated from the overall scores multiplied by the weight of each performance indicator as mandated under the provisions established by the Director General Regulation Number: KP-DRJD 539 of 2022. The results of the calculation using the above formula related to port performance scores are as follows:

Table 1.

Port Performance Assessment Recapitulation

No	Indicator	Indicator Value	Weighting	Performance Value
1	Vehicle Number Development	100	0.035	3.50
2	Passenger Number Development	100	0.035	3.50
3	Ship Number Development	50	0.007	0.35
4	Vehicle Carrier Customer Satisfaction	76.57	0.126	9.64
5	Pedestrian Passenger Customer Satisfaction	61.33	0.126	7.72
6	Ship Operator Customer Satisfaction	70.86	0.126	8.93
7	Movement Time (Maneuvering Time)	60	0.152	9.12

⁷ Fathurrahman Nurul Hakim, "STRATEGI PENGEMBANGAN MINUMAN TRADISIONAL WEDANG REMPAH DI PENDOPONDE' LUWEH RESTAURAN SEBAGAI WISATA KULINER DI YOGYAKARTA," *Jurnal Pariwisata* null (2023): null, <https://doi.org/10.31294/par.v10i1.15111>.

⁸ Keputusan Jenderal Perhubungan Darat KP-DRJD Nomor 539 Tahun 2022 Direktur, "Pedoman Perencanaan, Pembangunan Dan Evaluasi Kinerja Pelabuhan Sungai, Danau Dan Penyeberangan" (2022).



No	Indicator	Indicator Value	Weighting	Performance Value
8	Average Time for Vehicles to Board Ships	60	0.038	2.28
9	Average Time for Vehicles to Disembark from Ships	100	0.038	3.80
10	Waiting Time for Vehicles to Board Ships	20	0.076	1.52
11	Berth Occupancy Ratio (Bor)	40	0.152	6.08
12	Availability of Technical Plan Documents	7.14	0.009	0.06
13	Port Development and Port Licensing	0	0.009	0.00
14	Implementation of Action Plans in Planning Documents	12.5	0.009	0.11
15	Service Systems and Procedures	16.67	0.009	0.15
16	Zoning System Implementation	79.55	0.015	1.19
17	Main Ferry Port Facilities	45.83	0.003	0.14
18	Supporting Ferry Port Facilities	28.68	0.006	0.17
19	Standards for passenger services	53.57	0.006	0.32
20	Standards for vehicle services	45	0.006	0.27
21	Standards for ship services	29.27	0.009	0.26
22	Human Resource Availability	14.63	0.009	0.13
TOTAL NILAI KINERJA			1.00	59.33

Source: Researcher Analysis, 2025.

Based on the results of the performance evaluation above, the performance score of Ambarita Ferry Port is 59.33, which falls into the moderate category.

b. Evaluation of Passenger and Vehicle Service Performance using Importance Performance Analysis

Testing the validity and reliability of the attributes of the passenger and vehicle service performance assessment questionnaire with a trial involving 30 respondents. The validity testing criteria were based on comparing the correlation values between each questionnaire attribute and the total value (the sum of each questionnaire score) and the RTable value with a sample of 30 respondents, namely $Df = N - 1 = 30 - 1 = 29$, so the RTable value at a significance level of 95% (0.05) is 0.355. The validity test results are as follows:

Table 2.

Results of Performance Attribute and Importance Validity Tests

No	Question Indicator (Variable)	code	correlation coefficient Performance	correlation coefficient Importance	correlation table	Ket
1	Safety	X1	0.593	0.732	0.355	valid
		X2	0.552	0.520	0.355	valid
2	Security	X3	0.706	0.897	0.355	valid
		X4	0.805	0.870	0.355	valid



		X5	0.431	0.672	0.355	valid
3	Comfort	X6	0.412	0.924	0.355	valid
		X7	0.447	0.434	0.355	valid
		X8	0.643	0.813	0.355	valid
		X9	0.661	0.906	0.355	valid
		X10	0.411	0.671	0.355	valid
		X11	0.475	0.672	0.355	valid
		X12	0.773	0.701	0.355	valid
		X13	0.459	0.652	0.355	valid
		X14	0.441	0.724	0.355	valid
4	Convenience	X15	0.475	0.732	0.355	valid
	Affordability	X16	0.413	0.732	0.355	valid
		X17	0.487	0.420	0.355	valid
		X18	0.443	0.924	0.355	valid
		X19	0.407	0.806	0.355	valid
		X20	0.481	0.682	0.355	valid
		X21	0.408	0.813	0.355	valid
5	Reliability	X22	0.459	0.520	0.355	valid
	Regularity	X23	0.476	0.732	0.355	valid
		X24	0.883	0.854	0.355	valid
		X25	0.910	0.854	0.355	valid
		X26	0.418	0.803	0.355	valid
6	Equality	X27	0.514	0.507	0.355	valid
		X28	0.471	0.435	0.355	valid

Sumber: Hasil Analisa, 2025.

The validity test results for each attribute of the performance assessment questionnaire and the importance of passenger and vehicle services at Ambarita Ferry Port with a correlation coefficient > correlation table indicate that the data for these attribute variables is valid.

Reliability testing was conducted to determine the consistency of questionnaire attributes, as measured using Cronbach's alpha with the provision that if the value Cronbach Alpha > 0,6 is therefore declared reliable. The research variables were subjected to reliability testing, with the results outlined below:

Table 3.
Reliability Test Results for Performance and Importance Attributes

Pengujian	Cronbach Alpha	Number of attributes	Description
Kinerja	0.910	28	Reliabel
Kepentingan	0.964	28	Reliabel

Source: Researcher Analysis, 2025.

The attributes' reliability test results indicated that of performance assessment and the importance of passenger and vehicle services at the Ambarita Ferry Port with a Cronbach Alpha value > 0.6 and a significance level of 5% indicate that the questionnaire is reliable. Based on the results of the validity and reliability tests on the questionnaire attributes to be used in the



assessment of passenger and vehicle services, the number of respondents for the assessment of passenger and vehicle service performance is as follows:

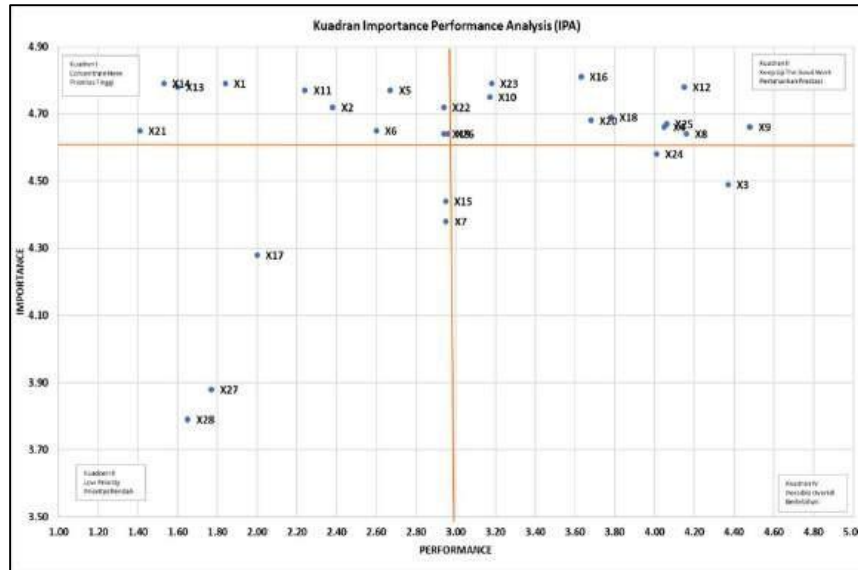
$$n = \frac{166.798}{1 + 166.798 \times (0,1)^2} = 99.94 \sim 100 \text{ (rounding) Respondents.}$$

Based on the above calculations, the number of research respondents was determined to be 100 respondents, whose assessment results will be analyzed using the Importance Performance Analysis method. The analysis of the level of conformity between performance and importance in the implementation of passenger and vehicle services is as follows:

Table. 4
Level of Alignment between Performance and Interests

Indicator	Performance Level (Xi)	Importance Level (Yi)	Compatibility Level (Tki)
X1	1.84	4.79	38%
X2	2.38	4.72	50%
X3	4.37	4.49	97%
X4	4.05	4.66	87%
X5	2.67	4.77	56%
X6	2.60	4.65	56%
X7	2.95	4.38	67%
X8	4.16	4.64	90%
X9	4.48	4.66	96%
X10	3.17	4.75	67%
X11	2.24	4.77	47%
X12	4.15	4.78	87%
X13	1.60	4.78	33%
X14	1.53	4.79	32%
X15	2.95	4.44	66%
X16	3.63	4.81	75%
X17	2.00	4.28	47%
X18	3.78	4.69	81%
X19	2.94	4.64	63%
X20	3.68	4.68	79%
X21	1.41	4.65	30%
X22	2.94	4.72	62%
X23	3.18	4.79	66%
X24	4.01	4.58	88%
X25	4.06	4.67	87%
X26	2.96	4.64	64%
X27	1.77	3.88	46%
X28	1.65	3.79	44%
Total	2.97	4.60	65.77%

Source: Researcher Analysis, 2025



Source: Researcher Analysis, 2025.

From the analysis, it can be seen that, the attributes included in Quadrants I to IV are as follows: Attributes included in Attributes categorized in Quadrant I include emergency rescue facilities (such as fire extinguishers, evacuation route signage, assembly points, and emergency contact numbers), health services, security-related facilities (e.g., complaint stickers), restroom availability, the adequacy of waiting area space, weighbridges and their attendants, designated designated parking areas for drop-off and pick-up, vehicle weighing instruments, the count of operational ticket booths, and dedicated traffic lanes intended for separating vehicle types. Meanwhile, Quadrant II consists of attributes such as security systems (CCTV), food and beverage facilities (canteens), lighting systems, arrival and departure lanes for passengers, temperature regulation equipment, information services regarding arrivals, information on departures and service interruptions, along with passenger service desks, baggage handling (porter) services, ticket queuing facilities, and queuing time for vehicle loading. Attributes included in Quadrant III are prayer rooms, service information (floor plans/layouts and fares), information on connecting transportation, facilities for people with disabilities, and breastfeeding rooms. Attributes included in Quadrant IV are security personnel in uniform with identification and the availability of staff. Port Performance Improvement.

c. Planning to Improve Services for Future Passenger and Vehicle Needs

1) Analysis related to the estimation of passenger and vehicle demand for the upcoming five-year period

Passenger and vehicle demand was analyzed using the least squares method to project movement trends over a medium-term period of five years. The resulting projections serve as the basis for estimating the required service facilities for both passengers and vehicles. These include the determination of passenger terminal capacity, vehicle parking area needs, and the spatial arrangement of service facilities at Ambarita Ferry Port. This analysis is based on passenger and vehicle data from 2020 to 2024 as follows:



Table. 5

Passenger and Vehicle Model Equations

No	Kategori	Equation $Y = a + bX$
1	Adults	$Y = 6.378 + 1.357,7 X$
2	Children	$Y = 187.4 + 12.5 X$
3	Passengers in vehicles	$Y = 705.974.5 + 87.003.5 X$
4	Gol I	$Y = 35.2 + 6.4 X$
5	Gol II	$Y = 10.745.6 + 3.521.4 X$
6	Gol III	$Y = 216.20 + 40.80 X$
7	Gol IV. A	$Y = 74.514.4 + 11.679.4 X$
8	Gol IV. B	$Y = 3.457.2 + 324.5 X$
9	Gol V. A	$Y = 2.975 + 1234.7 X$
10	Gol V. B	$Y = 237 + 108.5 X$
11	Gol VI. A	$Y = 70.6 + 12.4 X$
12	Gol VI. B	$Y = 77.8 + 11.4 X$
13	Gol VII	$Y = a + b X$
14	Gol VIII	$Y = a + b X$
15	Gol IX	$Y = a + b X$

Source: Researcher Analysis, 2025.

Table 6
Total Passengers and Vehicles 2020 - 2029

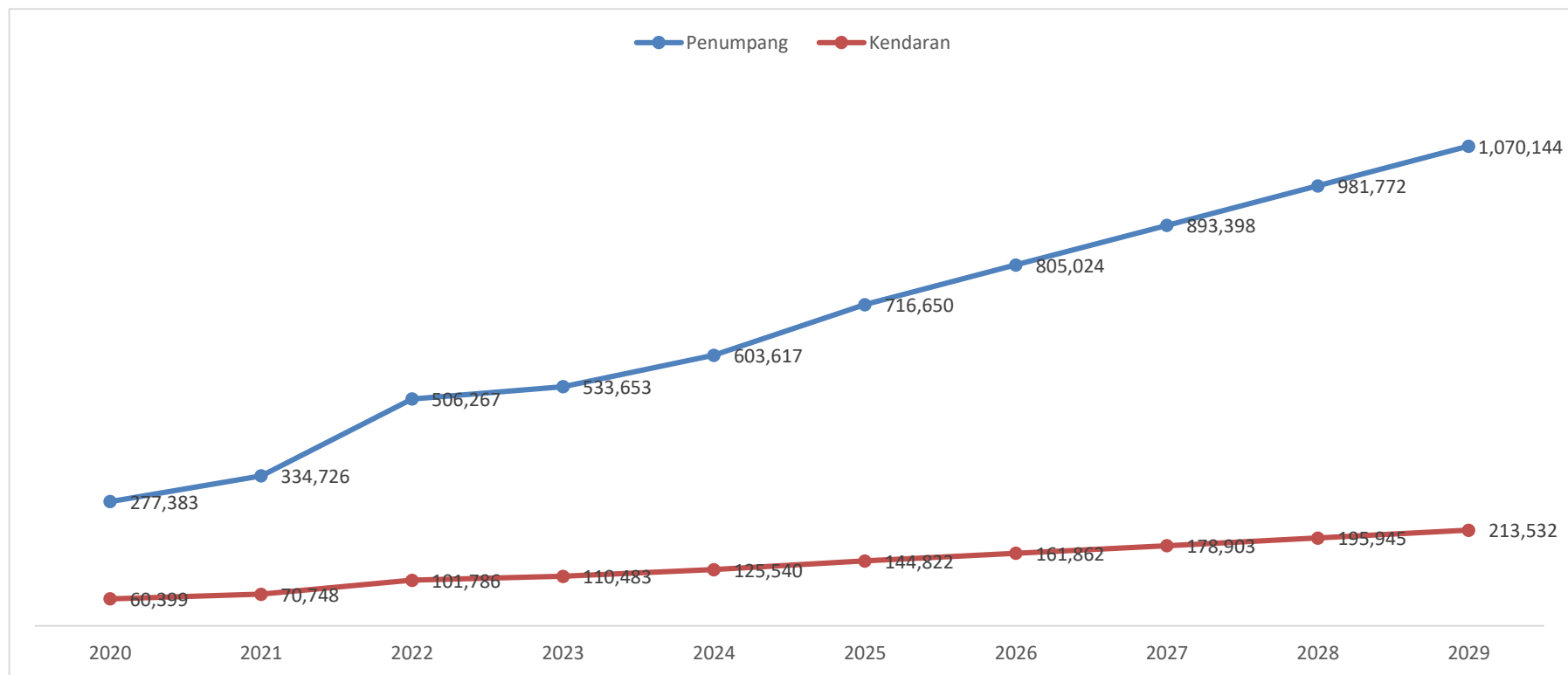
Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Passengers Pedestrians	4.528	5.183	8.161	7.169	9.086	10.676	12.046	13.416	14,787	16.156
Adults	3.108	4.891	8.050	6.998	8.843	10.451	11.808	13.166	14.524	15.881
Children/Infants	120	292	111	171	243	225	238	250	263	275
Passengers in vehicles	267.070	329.543	498.106	526.484	594.531	705.974	792.978	879982	966.985	1.053.988
Total Passengers	277.383	334.726	506.267	533.653	603.617	716.650	805.024	893.398	981.772	1.070.144
Gol I	26	25	34	41	50	55	61	68	74	80
Gol II	6.508	5.995	7.462	13.301	20.462	21.310	24.832	28.352	31.874	35.936
Gol III	164	165	164	275	313	339	380	421	461	502
Total two-wheeled vehicle	6.698	6.185	7.660	13.617	20.825	21.704	25.273	28.841	32.409	36.518
Gol IV A	47.694	59.632	86.412	85.854	92.980	109.553	121.232	132.912	144.590	156.273
Gol IV B	3.309	2.649	3.252	3.640	4.436	4.431	4.753	5.080	5.405	5.729
Gol V A	847	1.239	3.063	4.172	5.554	6.680	7.914	9.146	10.383	11.618
Gol V B	1.459	867	1.137	2.571	1.176	1.783	1.898	2.011	2.125	2.239
Gol VI A	110	58	163	345	509	563	671	780	888	997
Gol VI B	62	12	55	188	36	108	121	133	145	158
Gol VII	-	-	-	-	-	-	-	-	-	-
Gol VIII	-	-	-	-	-	-	-	-	-	-
Gol IX	-	-	-	-	-	-	-	-	-	-
Total four-wheeled vehicle	53.700	64.562	94.126	96.866	104.715	123.118	136.589	150.062	163.536	177.014
Total vehicles	60.399	70.748	101.786	110.483	125.540	144.822	161.862	178.903	195.945	213.532

Source: Researcher Analysis, 2025



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The Title of Article



Source: Researcher Analysis, 2025.



Forecasts of passenger and vehicle demand over the upcoming five-year period reveal a rising trend. It is estimated that the number of passengers in 2025 will reach 716,650, representing an increase of 18.73% compared to 2024. Meanwhile, by 2029, the number of passengers is projected to reach 1,070,144 people. For vehicles, the estimate for 2025 is 144,822 mixed-use vehicles, with 123,718 four-wheeled vehicles, representing a 15.35% increase from the previous year. As for 2029, the number of vehicles is estimated to reach 213,532 units, consisting of 177,014 four-wheeled vehicles and 36,518 two-wheeled vehicles. Based on this data, the daily average number of four-wheeled vehicles in 2025 is estimated to be 337 units, increasing to 485 units in 2029.

4. Closing

a. Conclusion

The findings of this study indicate that the current performance of Ambarita Ferry Port, as measured by performance evaluation indicators, has a score of 59.33, which falls into the moderate category. The operational performance of services provided to passengers and vehicles, as measured by the Importance Performance Analysis method, has a level of conformity between performance and service importance of 65.77%. Additionally, improvements are directed toward providing service facilities in accordance with the analysis results in Quadrant I and Quadrant III, such as installing protective roofs along pedestrian paths, installing crossing signs, and providing service information in the form of port maps/layouts, tariffs, and information on connecting transportation. Facility layout is also recommended to use a zoning system approach to create a more orderly and efficient service flow; The development initiative to optimize passenger and vehicle service delivery at Ambarita Ferry Port aims to accommodate the 2029 demand forecast of 1,070,144 passengers and 213,532 mixed vehicles.

b. Suggestion

- 1) Passenger and vehicle services require enhancement through the provision of sufficient infrastructure, area management based on functional zoning, and the enforcement of service standards aimed at ensuring safety, efficiency, comfort, and orderly port operations;
- 2) Improvements need to be made to facilities for pedestrians through the installation of crossing signs, optimization of information services, and connectivity between passenger counters and waiting rooms to facilitate the mobility of service users within the port area;
- 3) It is necessary to improve port facilities and increase the number of ships over the next five years in order to anticipate and accommodate the increase in passenger and vehicle demand.



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