

Analysis of Ferry Services on the KMP Lohoraung and KMP Tarusi at Likupang Port

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ABSTRACT

This study aims to evaluate the quality of ferry transportation services at Likupang Ferry Port based on the Minimum Service Standards (MSS) using the Importance Performance Analysis (IPA) method. Likupang Ferry Port plays an important role in supporting community mobility, goods distribution, and economic and tourism activities in North Sulawesi. However, several service problems are still encountered, such as inadequate safety, health, and passenger comfort facilities, which may affect customer satisfaction. This study employed a quantitative approach by collecting primary data through observations, interviews, and questionnaires distributed to 338 users of the ferry services of KMP Lohoraung and KMP Tarusi. The data were analyzed using the IPA method, while validity and reliability tests were conducted using SPSS. The results showed that the passenger service conformity level was 48.38% on KMP Lohoraung and 51.61% on KMP Tarusi, indicating that both vessels have not yet met the MSS. Meanwhile, vehicle services were categorized as good, with conformity levels of 85.18% on KMP Lohoraung and 81.48% on KMP Tarusi. The ship operational aspect achieved a conformity level of 100% for operating schedules, berthing time, loading and unloading, and sailing speed. The IPA revealed that the main service attributes requiring improvement are lifeboat condition, medical rooms, passenger toilets, prayer rooms, lighting, and nursing rooms, as these attributes have high importance but low performance. All research instruments were valid and reliable. This research is expected to serve as an evaluation reference for port management and ferry operators in improving ferry services at Likupang Ferry Port.



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1. INTRODUCTION

Likupang Ferry Port is one of the maritime transportation facilities that plays an important role in supporting community mobility and the distribution of goods in the North Sulawesi region. Maritime transportation infrastructure contributes significantly to regional connectivity and economic development, including coastal and marine tourism (Mamengko & Kuntari, 2020; Nikolaou & Dimitriou, 2021). This port serves as a link between coastal and island

regions, thereby supporting the economic, social, and tourism activities of local communities. As public demand for safe, comfortable, and punctual transportation continues to increase, the quality of ferry transportation services is also expected to improve.

However, several service-related issues are still encountered in its operation, including delays in vessel departures, limited passenger facilities, inadequate safety and health facilities, and suboptimal service information systems. These conditions may affect user satisfaction and the operational efficiency of the port.

The quality of transportation services is strongly influenced by aspects such as safety, comfort, punctuality, and supporting facilities, all of which are directly related to customer satisfaction (Abdu & Patarru, 2023; Sinha et al., 2020). Furthermore, service evaluation using the Importance Performance Analysis (IPA) method is considered effective in identifying service attributes that should be prioritized for improvement in the transportation sector (Putri et al., 2024; Sinha et al., 2020).

Previous studies on ferry and sea passenger transportation have shown that passenger safety and comfort facilities remain the dominant factors influencing perceptions of service quality (Putra et al., 2024; Žanić Mikuličić et al., 2024). Studies of ferry services in Indonesia have also found service gaps in safety, comfort, punctuality, information, and cleanliness (Della et al., 2025; Haerullah et al., 2024), while IPA-based evaluations of other ferry routes have identified safety facilities as priorities for improvement (Bakri et al., 2025; Ramadhani et al., 2025). Nevertheless, studies evaluating ferry services in island regions, particularly at Likupang Ferry Port, remain limited, highlighting the need for further research.

The novelty of this study lies in the evaluation of ferry transportation services at Likupang Ferry Port using the Importance Performance Analysis approach based on the Minimum Service Standards for ferry transportation stipulated in Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 62 of 2019 (Kementerian Perhubungan Republik Indonesia, 2019). The study focuses on two active vessels, namely KMP Lohoraung and KMP Tarusi. Accordingly, this study aims to evaluate the conformity of passenger services, vehicle services, and vessel operations on KMP Lohoraung and KMP Tarusi with the Minimum Service Standards and to identify, through IPA, the service attributes that should be prioritized for improvement.

2. METHODS

This study employed a quantitative approach using both primary and secondary data sources. Primary data were obtained directly through field observations, interviews, and

questionnaires distributed to ferry service users (Haerullah et al., 2024). Secondary data were collected from relevant institutional documents, scientific journals, and the regulations supporting the study.

Prior to the distribution of the questionnaires, the research instrument was tested for validity and reliability to ensure that each indicator could measure the service variables consistently and accurately (Putra et al., 2024; Rosita et al., 2021). The IPA method was employed to assess the levels of importance and service performance, thereby identifying the service attributes that should be prioritized for improvement (Prasetyo et al., 2023).

The sample size was determined using the Slovin formula:

$$n = \frac{N}{(1+Ne^2)} \quad (1)$$

where n is the sample size, N is the population size, and e is the margin of error (error tolerance level). On this basis, 338 respondents were involved in this study.

3. RESULTS AND DISCUSSION

3.1. Respondent Characteristics

The 338 respondents consisted of 198 men (59%) and 140 women (41%), as shown in Table 1. Most respondents were aged 21–40 years (61%), while 12% were younger than 20 years and 27% were older than 40 years (Table 2).

Table 1. Respondent characteristics based on gender

Gender	Number	Percentage
Male	198	59%
Female	140	41%
Total	338	100%

Table 2. Respondent characteristics based on age

Age	Number	Percentage
< 20 years	42	12%
21–30 years	110	33%
31–40 years	96	28%
> 40 years	90	27%
Total	338	100%

3.2. Service Conformity Level Analysis

The results of the study indicate that passenger services on KMP Lohoraung achieved a conformity level of 48.38%, while KMP Tarusi achieved 51.61%. These values indicate that

passenger services on both vessels have not yet met the Minimum Service Standards (MSS) (Kementerian Perhubungan Republik Indonesia, 2019; Sulistyono et al., 2022).

Table 3. Passenger service conformity level

Vessel	Conformity Level	Category
KMP Lohoraung	48.38%	Does not meet MSS
KMP Tarusi	51.61%	Does not meet MSS

Several facilities that do not yet meet the required standards include health facilities, medical rooms, wheelchairs, oxygen cylinders, nursing rooms, prayer rooms, gender-separated toilets, and security facilities such as CCTV and security personnel.

Table 4. Vehicle service conformity level

Vessel	Conformity Level	Category
KMP Lohoraung	85.18%	Good
KMP Tarusi	81.48%	Good

Meanwhile, the vessel operational aspects achieved a conformity level of 100% for both vessels.

Table 5. Vessel operational conformity level

Operational Aspect	Conformity Level
Operating schedule	100%
Berthing time	100%
Loading and unloading activities	100%
Sailing speed	100%

3.3. Importance Performance Analysis (IPA)

The IPA was conducted to identify the service attributes that should be prioritized for improvement by comparing the level of importance with the level of performance of each attribute (Chatterjee & Kumar, 2022; Mutmainah et al., 2022; Sari & Fuad, 2023). The results are presented in Table 6 and Figure 1.

Table 6. Importance performance analysis (IPA) results

Service Attribute	Performance Level	Importance Level	Quadrant
Lifeboat condition	Low	High	I
Medical room	Low	High	I
Passenger toilets	Low	High	I
Prayer room	Low	High	I

Service Attribute	Performance Level	Importance Level	Quadrant
CCTV	High	High	II
Service information	High	High	II
Lighting facilities	Moderate	High	I
Nursing room	Low	High	I

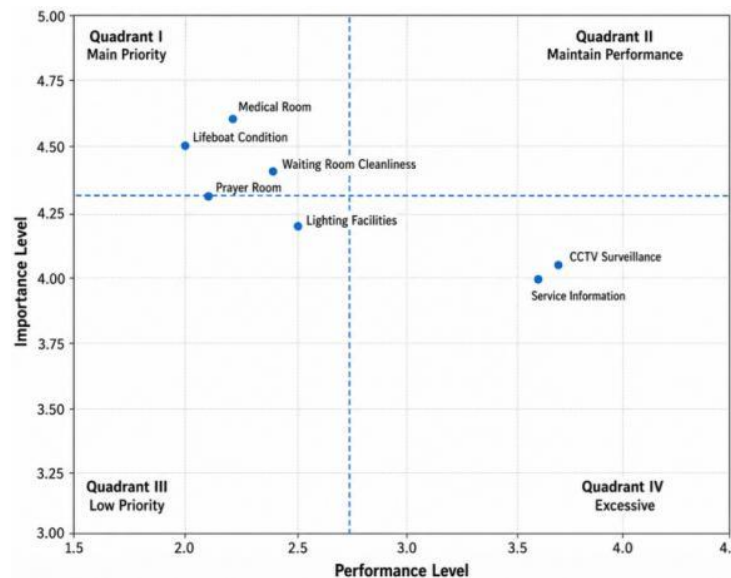


Figure 1. Importance–performance analysis (IPA) Cartesian diagram

Quadrant I – Main priority. This quadrant contains service attributes with a high level of importance but a low level of performance. These attributes should be given the highest priority for improvement because they have a significant impact on customer satisfaction. Service users consider safety, health, and comfort facilities to be very important aspects of ferry services; however, the current condition of these facilities is not yet optimal, so immediate improvements are required.

Quadrant II – Maintain performance. This quadrant contains service attributes with high levels of both importance and performance. Security facilities (CCTV) and service information are perceived to perform well and meet users' expectations; therefore, port management and vessel operators should maintain the quality of these services.

Quadrant III – Low priority. This quadrant contains service attributes with low levels of importance and performance. Most service attributes in this study were considered important by service users; therefore, no attribute was categorized as having a truly low level of importance.

Quadrant IV – Possible overkill. This quadrant contains service attributes with a high level of performance but a relatively low level of importance, which suggests that the services provided are already very good but are not considered a primary priority by service users.

3.4. Validity and Reliability Test Results

Table 7. Validity test results

Variable	Calculated r-value	r-table	Description
Passenger service	0.712	0.300	Valid
Vehicle service	0.685	0.300	Valid
Vessel operation	0.754	0.300	Valid
Safety facilities	0.801	0.300	Valid

Table 8. Reliability test results

Variable	Cronbach's Alpha	Description
Passenger service	0.812	Reliable
Vehicle service	0.798	Reliable
Vessel operation	0.835	Reliable
Safety facilities	0.847	Reliable

Based on the test results, all questionnaire items have calculated r-values greater than the r-table value; therefore, all research instruments are considered valid. Furthermore, the Cronbach's Alpha values for all variables are greater than 0.70, indicating that the research instruments are reliable and suitable for use in this study (Rosita et al., 2021; Yudhana, 2022).

3.5. Discussion

The results of this study indicate that the quality of ferry services at Likupang Ferry Port has not yet fully met the Minimum Service Standards (MSS) stipulated in Regulation of the Minister of Transportation Number PM 62 of 2019 (Kementerian Perhubungan Republik Indonesia, 2019). Based on the passenger service conformity analysis, KMP Lohoraung obtained a score of 48.38%, while KMP Tarusi achieved 51.61%. These values indicate that passenger services on both vessels have not yet met the service standards expected by users.

The low level of passenger service conformity is influenced by the inadequate availability of safety, health, and comfort facilities on board. Several facilities that are not yet optimally available include medical rooms, wheelchairs, oxygen cylinders, nursing rooms, prayer rooms, gender-separated toilets, and security facilities such as CCTV and security personnel. This condition indicates that passengers' basic needs related to safety and comfort have not been fully met. These findings are consistent with previous studies stating that safety and comfort

facilities are dominant factors influencing perceptions of maritime transportation service quality (Della et al., 2025; Haerullah et al., 2024; Žanić Mikuličić et al., 2024).

In terms of vehicle services, the results show a relatively good level of conformity, reaching 85.18% on KMP Lohoraung and 81.48% on KMP Tarusi. This indicates that vehicle-related services, such as loading and unloading operations, vehicle arrangement, and vehicle security during the voyage, have been implemented effectively. Furthermore, the vessel operation aspect achieved a conformity score of 100% for operating schedules, berthing time, loading and unloading activities, and sailing speed, which demonstrates that vessel operations have been carried out in accordance with applicable standards.

Based on the IPA results, several service attributes were identified in Quadrant I, which represents the highest priority for improvement. These attributes include lifeboat condition, medical room facilities, passenger toilets, prayer rooms, lighting facilities, and nursing rooms. They have a high level of importance but a low level of performance, requiring serious attention from port authorities and vessel operators, in line with IPA-based ferry service studies that likewise identify safety and comfort attributes, including lifeboats, as improvement priorities (Bakri et al., 2025; Putri et al., 2024; Ramadhani et al., 2025).

Meanwhile, CCTV and service information are positioned in Quadrant II, indicating that both their importance and performance levels are high. This finding suggests that information services and security measures have been implemented effectively and that their quality should be maintained; digital service innovation can further strengthen the quality of public service information (Sangaji & Irianto, 2025). The validity and reliability tests confirm that the research instrument is valid and reliable, so the data can be used to accurately and consistently describe the condition of ferry services at Likupang Ferry Port. Although CCTV coverage and security personnel did not fully meet the MSS checklist, respondents perceived the performance of the existing CCTV as good, which places it in Quadrant II; the checklist assessment and user perceptions therefore complement each other.

4. CONCLUSION

Based on the evaluation of ferry services at Likupang Ferry Port using the IPA method, the passenger service conformity level was 48.38% on KMP Lohoraung and 51.61% on KMP Tarusi, indicating that both vessels have not yet met the Minimum Service Standards. The low quality of passenger services is influenced by the inadequate provision of safety, health, and comfort facilities, such as medical rooms, passenger toilets, prayer rooms, nursing rooms, lighting, and other safety-related facilities. Nevertheless, vehicle services on both vessels were

categorized as good, with conformity levels of 85.18% on KMP Lohoraung and 81.48% on KMP Tarusi, and vessel operational aspects, including sailing schedules, berthing time, loading and unloading, and sailing speed, achieved a conformity level of 100%.

The IPA results indicate that the service attributes requiring the highest priority for improvement are located in Quadrant I, namely lifeboat condition, medical rooms, passenger toilets, prayer rooms, lighting facilities, and nursing rooms. Port management and vessel operators therefore need to improve passenger safety, health, and comfort facilities through the provision of medical rooms, separate toilets, prayer rooms, nursing rooms, wheelchairs, and oxygen cylinders, as well as improvements to lifeboats and lighting. Routine monitoring and evaluation of compliance with the MSS are required, while well-performing aspects, such as service information and security facilities, should be maintained. For future research, it is recommended to employ other analytical methods, such as SERVQUAL or the Customer Satisfaction Index (CSI), to obtain a more comprehensive evaluation of service quality.

5. DECLARATIONS

Author contributions: S.: Conceptualization, Methodology, Project administration, Writing – original draft; P.M.L.: Formal analysis, Validation; E.N.W.: Investigation, Data curation; R.S.: Software, Visualization; A.R.: Writing – review & editing. All authors approved the version of the manuscript to be published.

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AI usage statement: The questionnaire design, statistical processing in SPSS, IPA mapping, and manuscript writing were carried out by the authors without generative AI assistance.

Ethical approval: Respondents completed the questionnaire anonymously and voluntarily after being informed of the purpose of the survey; no identifying information was collected.

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Data availability: The anonymised questionnaire data, MSS checklist results, and SPSS output are available from the corresponding author upon reasonable request.

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