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Quality of Container Loading and Unloading Service at the Kariangau Container Terminal Based on User Perception

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ABSTRACT

The Kariangau Container Terminal serves as a port facilitating loading and unloading operations in Balikpapan City and the New Capital of the Archipelago. However, its service quality has not yet reached an optimal level for all customers. This is evident from the relatively low user perception ratings across several indicators, including tangibles, reliability, responsiveness, assurance, empathy, and credibility. This study aims to evaluate the quality of container loading and unloading services at Kariangau Container Terminal by examining user perceptions and expectations. The methods employed include Gap Analysis and the Customer Satisfaction Index (CSI). The key assessment indicators are tangibles, reliability, responsiveness, assurance, empathy, and credibility. The findings indicate that all customer satisfaction dimensions have negative gap values, suggesting that the service quality does not fully align with customer expectations. The analysis revealed an overall satisfaction level with an average gap of -0.365, indicating that while the service dimensions meet customer expectations to a certain extent, there is still room for improvement by Kariangau Container Terminal operators.

1. INTRODUCTION

The Kariangau Container Terminal serves as a key port supporting logistics activities in Balikpapan City and the development of the new National Capital (IKN) in East Kalimantan Province. This port functions as a primary transportation route for goods (logistics) to support IKN operations, considering environmental conditions, the Indonesian Archipelagic Sea Lanes, pool and channel depths, land availability, connectivity with planned transportation networks, and the spatial planning of the IKN area. Consequently, the Kariangau Container Terminal is expected to provide high-quality services that are time- and cost-efficient.

As a primary logistics hub supporting the development of IKN and Balikpapan City, the Kariangau Container Terminal plays a crucial role. Serving as the main gateway for logistics flows in the Kalimantan region, the quality of services provided by this terminal is essential for ensuring smooth operations and customer satisfaction, involving both domestic and international shipping service providers.

Located strategically in Balikpapan, East Kalimantan, the Kariangau Container Terminal has the capacity to accommodate increasing cargo traffic and is equipped with modern infrastructure designed to support efficient loading and unloading operations. The terminal handles various types of cargo, both domestic and international, with volumes expected to rise as the IKN region continues to develop.

With a total area of 72.5 hectares, a container yard capacity of 400,000 TEUs, and an annual handling capacity of 200,000 TEUs, the Kariangau Container Terminal is considered one of the significant medium-sized terminals in East Kalimantan. The terminal serves a diverse range of clients, including domestic and international shipping companies as well as land transport companies, making it a vital link in Indonesia's logistics supply chain. Major clients include PT Salam Pacific Indonesia Lines, PT Tanto Intim Line, PT Meratus, and PT Temas Tbk.

Although several studies have been conducted on service quality at container terminals, specific research evaluating user experiences at logistics support terminals in Indonesia remains limited. Most prior research has focused on large-scale main ports or international terminals, which have different dynamics and requirements compared to support terminals like Kariangau. Additionally, research in Indonesia predominantly focuses on operational efficiency or technical service aspects, with limited attention to the user perspective or direct customer experiences.

The assessment of product and service quality in a company generally refers to various factors or dimensions. Ten general dimensions serve as the criteria used by service users to evaluate service quality: tangibles, reliability, responsiveness,

competence, courtesy, credibility, security, access, communication, and understanding the customer. These ten dimensions are part of the ServQual (Service Quality) methodology [1]. In ServQual, the last seven dimensions are grouped into two broader categories: assurance and empathy, simplifying the ServQual dimensions into tangibles, reliability, responsiveness, assurance, empathy, and credibility.

Service quality is defined as the expected level of excellence and the control over that level to meet customer expectations [2]. To ensure a company's services surpass those of its competitors, it must deliver high-quality services that align with consumer interests. The level of interest consumers have in services is shaped by their experiences and the recommendations they receive. Consumers select service providers based on perceived importance and tend to compare their actual experience with their initial expectations after using the service.

Service quality is measured using the ServQual method, which addresses consumer needs and customer expectations. The gap analysis method is employed to determine the difference between customer expectations and their perception of service quality. The ServQual model uses a multi-item scale to measure customer expectations and perceptions across service quality dimensions. These dimensions are translated into questions representing the variables of expectations and perceptions, which are assessed using a Likert scale. The resulting gap values are then related to the Customer Satisfaction Index (CSI).

This research aims to analyze the quality of container loading and unloading services at the Kariangau Container Terminal based on user perceptions and expectations. It is significant for measuring customer satisfaction levels in terms of the provided service quality dimensions. Additionally, the study helps identify which service quality dimensions require improvement to enhance service delivery. If customer satisfaction levels are low, it could negatively impact trust and potentially reduce the demand for services.

The novelty of this research lies in the use of the ServQual method combined with gap analysis to directly measure user satisfaction with the services provided at the Kariangau Container Terminal. The application of this method in the context of container terminals in Indonesia remains limited, particularly in the use of specific indicators tailored to the needs of container terminal customers. This study also adds value by evaluating essential service quality dimensions such as tangibles, reliability, responsiveness, assurance, empathy, and credibility, which are critical for operational sustainability and customer satisfaction.

The findings of this study have important implications for the management of the Kariangau Container Terminal and similar terminals in Indonesia, providing a basis for targeted improvement priorities. This research not only contributes to the field of service quality management but also lays the groundwork for developing service improvement policies based on user experience, which has yet to be widely adopted at container terminals in Indonesia.

2. LITERATURE REVIEW

2.1 Service quality

The service quality gap model serves as a theoretical framework for evaluating customer expectations and perceptions of business service quality. A gap in service quality is defined as the difference between consumer expectations and their actual perception of the service provided [3]. This model assumes that customer service quality is impacted by the disparity between what customers expect before using the service and their perception of what they actually experience.

Service quality at container terminals is a critical element that affects the overall efficiency and effectiveness of port operations. Various methodologies and technological advancements have been shown to enhance service quality, which, in turn, improves the terminal's overall performance. This section highlights the primary factors contributing to service quality at container terminals, focusing on operational efficiency, customer satisfaction, and the role of information systems.

Operational efficiency is a fundamental aspect in assessing service quality at container terminals. Research indicates that public-private partnerships (PPP) can significantly improve cargo-handling efficiency, leading to increased capacity and higher throughput at ports [4]. For example, Wicaksono and Djakfar's study demonstrates the application of the Customer Satisfaction Index (CSI) and Quality Function Deployment (QFD) methodologies to evaluate and enhance terminal services [5]. These methods provide a structured approach to assessing service performance, helping operators pinpoint areas for improvement and develop targeted strategies.

Moreover, the use of information systems is vital for boosting port logistics performance. Mlimbila and Mbamba [6] highlight that advanced information systems minimize manual processes and improve the timely flow of information, which is crucial for quality control and decision-making in port operations. Implementing technology not only optimizes processes but also enhances resource utilization, as shown in the case of the New Makassar Container Port, which leverages improved operational strategies to manage increasing container volumes [7].

Customer satisfaction is another key component of service quality at container terminals. Empirical evidence from a study by Le et al. [8] in Vietnam shows a direct correlation between port logistics service quality and customer satisfaction. This finding underscores the importance of understanding customer needs and expectations to enhance service delivery. Additionally, performance evaluation models proposed by Wang et al. [9] emphasize the necessity of multi-criteria decision-making methods to effectively assess service performance.

The competitive nature of container terminals calls for continuous service quality improvements. Research suggests that factors such as handling costs, infrastructure conditions, and service diversity play significant roles in port selection decisions from a customer's perspective [10]. This competition pushes terminal operators to continuously innovate and adapt their services to meet the changing needs of the shipping industry.

Quality encompasses all the characteristics and attributes of a product or service that determine its ability to meet explicit or implicit customer needs [11]. The five commonly adopted perspectives on quality include the transcendental, product-based, user-based, manufacturing-based, and value-based approaches [12].

The ServQual model simplifies these perspectives into six key dimensions: tangibles, reliability, responsiveness,

assurance, empathy, and credibility. The ServQual method for measuring service quality involves assessing both consumer needs and customer expectations.

2.2 Customer satisfaction

Customer satisfaction refers to the sense of contentment or disappointment that arises when comparing the actual performance of a product or service to what was expected [12]. From this definition, customer satisfaction is determined by how a customer feels about the provided service relative to their expectations. Consumers with higher expectations may find it more difficult to feel satisfied compared to those with more moderate expectations. Four main factors that influence customer expectations include personal needs, previous experiences, word-of-mouth recommendations, and internal communication.

Customer satisfaction at ports and container terminals is influenced by a range of factors, such as service quality, logistical efficiency, and overall port management. Research indicates that the service quality at ports greatly affects customer satisfaction levels among shipping lines and other stakeholders in the logistics chain.

One of the key drivers of customer satisfaction in container terminals is the reliability of service attributes. According to Lu et al. [13], essential service attributes for shipping lines include the reliability of scheduled vessel departures, the efficiency of customs declarations, loading and unloading operations, port tariffs, and berth availability. This aligns with findings by Filina-Dawidowicz and Gajewska [14], who emphasize that comprehensive service quality, especially for refrigerated containers, directly impacts customer satisfaction. Their research suggests that terminal operators should prioritize these service attributes to meet customer expectations effectively.

Additionally, the importance of digitalization in enhancing customer satisfaction cannot be understated. Wu's [15] research on container shipping services in Indonesia highlights the significant role digital trust plays in influencing customer satisfaction and loyalty in competitive markets. Balcı et al. [16] also argue that relationship-building strategies, including digital engagement, are crucial for sustaining customer loyalty in the container shipping sector. Incorporating digital tools not only enhances operational efficiency but also strengthens the connection between service providers and customers, thereby boosting overall satisfaction.

The adoption of structured evaluation methods, such as the Customer Satisfaction Index (CSI) and Importance-Performance Analysis (IPA), has also proven to be effective in assessing and enhancing service quality at container terminals. For example, Wicaksono and Djakfar applied these methods to evaluate service performance at the Port of Tenau-Kupang, yielding critical insights into areas needing improvement [5]. Similarly, the Balanced Scorecard (BSC) framework has been recommended as a tool for measuring competitive advantage and customer satisfaction in port operations [17]. These methodologies help terminal operators systematically identify service delivery gaps and implement focused improvements.

Lastly, the impact of corporate sustainability initiatives on customer satisfaction is highlighted in the literature. Shin et al. found that sustainable practices positively influence customer satisfaction and repurchase intentions, indicating that customers increasingly value sustainability in their service providers [18]. This trend suggests that container terminals that adopt sustainable practices may gain a competitive edge by enhancing customer satisfaction levels.

3. METHODS

3.1 Research site

This study was conducted at PT Kaltim Kariangau Terminal, located in Balikpapan City, East Kalimantan Province, Indonesia (as shown in Figure 1).

PT Kaltim Kariangau Terminal has a container yard area of 8 hectares and a yard capacity of 400,000 TEUs per year, as shown in Figure 2.

Figure 1. Research site

Figure 2. Container yard

3.2 Determination of variable

A user-based approach was employed to measure service quality, using a quantitative survey that focused on six service quality dimensions: tangibles, reliability, responsiveness, assurance, empathy, and credibility.

These dimensions of service quality are the variables being studied, with each variable having its own indicators. The indicators used are adapted to customer satisfaction issues at container terminals, derived from literature studies. The indicators have also been tailored to the services provided by loading and unloading operations at the Kariangau Container Terminal, as shown in Table 1. The indicators for each variable are arranged in a questionnaire to compare the Perceived Service (reality) with Expectations (hope) based on the Level of Importance. The measurement scale, using a Likert scale to describe expectations and reality, is as follows:

- The scale for measuring the "level of expectation" is: (1) Very Dissatisfied, (2) Dissatisfied, (3) Neutral, (4) Satisfied, (5) Very Satisfied.
- The scale for measuring the "level of reality" for experienced services is: (1) Very Dissatisfied, (2) Dissatisfied, (3) Neutral, (4) Satisfied, (5) Very Satisfied.

Table 1. Research variable

Dimensions of Service Quality	Service Quality Indicators used	
Tangible [19-22]	X01	Suitability of ship wharf conditions
	X02	Container stacking yard is adequate and feasible
	X03	The container stacking yard is neatly arranged
	X04	The appearance of the officers in the field is good and communicative
	X05	Sufficient number of officers (administration, operational tally, and TKBM)
	X06	The condition of loading and unloading equipment at the terminal (forklift, RS, SL, HT, RTG, CC) is good and well maintained
	X07	The number of loading and unloading equipment at the terminal (forklift, RS, SL, HT, RTG, CC) is adequate
	X08	Information boards are available well and adequately
	X09	Public facilities are in good condition and adequate
Reliability [23, 24]	X10	Compliance with the ship's docking schedule at the pier
	X11	Compliance with ship loading and unloading schedules
	X12	The services of wharf and field tally operational officers are fast and precise
	X13	Administrative officers provide services quickly and precisely
	X14	TKBM officers are adequate and skilled in providing services
	X15	Loading and unloading equipment has high productivity
	X16	Rates are determined according to the services provided
	X17	Ease of payment system
	X18	Loading and unloading activities are recorded properly and correctly
Responsiveness [25-27]	X19	Administrative officers provide clear and easy to understand information
	X20	Admin officers are able to provide good and appropriate solutions to administrative problems
	X21	Wharf and field tally operations officers receive and respond to customer complaints quickly
	X22	Problems with unloading equipment can be resolved quickly and precisely by officers
	X23	Information facilities in the terminal area can be accessed 24 hours
Assurance [28, 29]	X24	Post security operational officers are responsive to security and order
	X25	Implementation of operations in the field in accordance with the System Operational Procedure (SOP)
	X26	The regulations are carried out properly and correctly
	X27	There are strict sanctions if there are deviations from regulations and SOP
	X28	The wharf and field tally operational officers have competence
	X29	Administrative officers have competence
Empathy [30-32]	X30	Terminal administration officers serve in a friendly and polite manner
	X31	The wharf and field tally operational officers serve in a friendly and polite manner
	X32	Officers are responsible for customer comfort
Credibility [33, 34]	X33	Terminal administration officers are honest and trustworthy
	X34	Wharf and field operations officers are honest and trustworthy

3.3 Data and informants

For this research, a sample of 30 respondents was selected from a total of 43 customers at the Kariangau Container Terminal. The sample size was chosen based on a representative proportion of 70% of the population, which is a standard practice in quantitative research to ensure a sufficient reflection of the entire population. The selection of 30 respondents was deemed adequate to accurately represent the users' perceptions and expectations at the terminal.

The selection of 30 respondents also considered the limitations in access and data collection capabilities, while still meeting the minimum standard of representation in similar

port service studies. Previous studies in port contexts have indicated that smaller sample sizes are acceptable when the total population is limited, especially when the total number is below 50.

Furthermore, this sample size determination is supported by literature, which states that for populations under 50, a sample size of at least 30 respondents can serve as a basis for statistical analysis, including validity and reliability analysis using quantitative methods such as ServQual and CSI.

The respondents for this study were chosen through purposive sampling, with the 30 primary informants comprising key customers of the Kariangau Container Terminal, including both domestic and international shipping companies, as well as land transportation firms. The survey was conducted over the course of a month to gather representative insights from a diverse group of customers. Selection criteria for the respondents were based on their direct interaction with the terminal services and the frequency of their service usage, ensuring the relevance of the data for assessing service quality.

3.4 Calculation of validity and reliability

For validity testing, the Pearson product-moment correlation is used with a significance level of 5%. The Pearson correlation formula, applied to determine the validity of the indicators, is presented in Eq. (1) [35]:

$$r = \frac{N\sum_{i=1}^{n} X_i Y_i - (\sum_{i=1}^{n} X_i \sum_{i=1}^{n} Y_i)}{\sqrt{[N\sum_{i=1}^{n} X_i{}^2 - (\sum_{i=1}^{n} X_i)^2] - [N\sum_{i=1}^{n} Y_i{}^2 - (\sum_{i=1}^{n} Y_i)^2]}} \quad (1)$$

where, X represents the value of each variable or question, Y is the total score for each respondent, and N is the number of respondents.

A questionnaire is considered reliable if α value obtained exceeds 0.6. Reliability is assessed using the following Eq. (2) [35]:

$$\alpha = \frac{K \times \bar{r}}{[1 + (K-1) \times \bar{r}]} \quad (2)$$

where, K represents the number of variables being analyzed, and r denotes the average correlation between the variables.

3.5 Gap analysis

Gap analysis was conducted by calculating the average scores for each indicator based on both customer perceptions and expectations, using a Likert scale. The gap value was determined by subtracting the expectation score (desired outcome) from the perception score (actual experience) for each service quality dimension. A positive gap value indicates that perceptions exceed expectations, while a negative value suggests that perceptions fall short of customer expectations. Additionally, the Customer Satisfaction Index (CSI) was computed by weighing each service dimension, with a higher CSI score reflecting greater customer satisfaction.

The difference between customer expectations and perceptions is referred to as the "gap," which helps determine their overall perception of service quality. Gap analysis is, therefore, a method used to compare customer expectations with the actual services received. In assessing service quality, the gap range is applied.

The ServQual model measures service quality using a multi-item scale that evaluates customer expectations and perceptions across various service quality dimensions. These dimensions are represented through a series of questions designed to assess both expectation and perception variables, using a Likert scale. The following formula is applied in the analysis of service quality [36]:

$$Gap = P - E \quad (3)$$

where, P represents Perceived Service (the customer's perception of the service), and E represents Expected Service (the customer's expectations of the service).

By calculating this gap, the level of customer satisfaction can be determined. A positive gap value indicates that consumers feel the service they received meets or exceeds their expectations. In contrast, a negative gap value suggests that the service quality falls short of their expectations. The lowest gap value serves as a key criterion that should be prioritized to improve service quality.

3.6 Customer Satisfaction Index (CSI)

The gap value range can be associated with the Customer Satisfaction Index (CSI). The classification of satisfaction levels, as measured through gap analysis, is presented in Table 2, where H represents the scale used in the study [9].

Table 2. Level of satisfaction with gap analysis

Gap Range	Satisfaction Level	CSI
> 0,00	Very satisfied	> 100
-0,15(H) ≤ Gap ≤ 0,00	Satisfied	85-100
-0,30(H) ≤ Gap < -0,15(H)	Fair	70 - <85
-0,45(H) ≤ Gap < -0,30(H)	Not satisfied	55 - <70
Gap < -0,45(H)	Very dissatisfied	< 55

4. RESULTS AND DISCUSSION

4.1 Validity and reliability result

Validity refers to the determination of whether the questionnaire is valid and whether the indicators within it effectively measure what the questionnaire intends to assess. In this study, validity was determined using product-moment (Pearson) correlation calculations based on the data collected from the questionnaire distribution. Validity testing was conducted on all indicators related to the quality of container loading and unloading services at PT Kaltim Kariangau Terminal. The criteria for decision-making regarding the validity test are as follows:

- If r-count > r-table → Valid.
- If r-count < r-table → Invalid.

In this study, there were 30 respondents, resulting in degrees of freedom (df) calculated as df = 30-2 = 28. With df = 28, the critical value of r was 0.361, as obtained from the r-table. During the validity test, if any indicator has an r-value lower than the r-table value, the indicator with the smallest r-value is removed from the dimension. This process continues until all indicators in the dimension are considered valid.

In addition to validity, the reliability of the indicators is also assessed. Reliability serves as a measure of the consistency of the indicators within a dimension or variable. A questionnaire is considered reliable if respondents' answers to the questions

remain consistent or stable over time. It is deemed reliable if the α (Cronbach's Alpha) value exceeds 0.6.

The validity and reliability of container customer satisfaction indicators at PT Kaltim Kariangau Terminal, as analyzed using the SPSS program, are explained as follows:

• Validity and Reliability of Customer Satisfaction Indicators (Expectations)

The outcomes of the r-count and α calculations for the validity and reliability of the indicators related to customer satisfaction expectations are presented in Table 3.

Table 3. Validity and reliability of indicators of customer satisfaction expectations

Validity Expectations	Validity (r) Calculation	Result
X01	0.726	Valid
X02	0.895	Valid
X03	0.921	Valid
X04	0.909	Valid
X05	0.882	Valid
X06	0.679	Valid
X07	0.704	Valid
X08	0.881	Valid
X09	0.826	Valid
X10	0.902	Valid
X11	0.950	Valid
X12	0.910	Valid
X13	0.886	Valid
X14	0.871	Valid
X15	0.736	Valid
X16	0.803	Valid
X17	0.838	Valid
X18	0.905	Valid
X19	0.916	Valid
X20	0.891	Valid
X21	0.941	Valid
X22	0.834	Valid
X23	0.864	Valid
X24	0.920	Valid
X25	0.921	Valid
X26	0.928	Valid
X27	0.806	Valid
X28	0.947	Valid
X29	0.930	Valid
X30	0.910	Valid
X31	0.877	Valid
X32	0.928	Valid
X33	0.925	Valid
X34	0.911	Valid

Notes: Reliability Statistics: Cronch's Alpha is 0.990; N of Items is 34.

The validity calculations showed that all the indicators used in this study had an r-count value greater than the r-table value of 0.361, indicating that all indicators are valid. As for the reliability results, the α (Cronbach's Alpha) value for all indicators exceeded 0.6, which means that the indicators are reliable for measuring customer satisfaction expectations at PT Kaltim Kariangau Terminal.

• Validity and Reliability of Customer Satisfaction Indicators (Reality)

The results of the r-count and α (Cronbach's Alpha) calculations for assessing the validity and reliability of the indicators measuring customer satisfaction expectations are presented in Table 4.

The validity calculations revealed that all the indicators employed in this study had an r-count exceeding the r-table value of 0.361, thus confirming that all indicators are valid. In terms of reliability testing, the α (Cronbach's Alpha) value for all indicators was greater than 0.6, indicating that the indicators are reliable for measuring customer satisfaction expectations at PT Kaltim Kariangau Terminal.

Based on the results of the tests, all indicators are suitable for further data analysis, as they meet the validity and reliability criteria for the questionnaire.

Table 4. Validity and reliability of indicators of customer satisfaction reality

Validity Reality	Validity (r) Calculation	Result
X01	0.790	Valid
X02	0.769	Valid
X03	0.901	Valid
X04	0.777	Valid
X05	0.780	Valid
X06	0.587	Valid
X07	0.688	Valid
X08	0.757	Valid
X09	0.589	Valid
X10	0.843	Valid
X11	0.866	Valid
X12	0.888	Valid
X13	0.841	Valid
X14	0.598	Valid
X15	0.668	Valid
X16	0.736	Valid
X17	0.836	Valid
X18	0.868	Valid
X19	0.909	Valid
X20	0.889	Valid
X21	0.861	Valid
X22	0.756	Valid
X23	0.700	Valid
X24	0.896	Valid
X25	0.773	Valid
X26	0.865	Valid
X27	0.877	Valid
X28	0.929	Valid
X29	0.891	Valid
X30	0.843	Valid
X31	0.757	Valid
X32	0.819	Valid
X33	0.828	Valid
X34	0.862	Valid

Notes: Reliability Statistics: Cronch's Alpha is 0.983; N of Items is 34.

4.2 Gap analysis and Customer Satisfaction Index (CSI)

The customer satisfaction indicators were further analyzed using the gap analysis method and the CSI index. This analysis involved calculating the average value of each indicator based on satisfaction levels, encompassing both customer expectations and perceptions. From these calculations, a gap value was derived, representing the difference between perceptions (reality) and expectations. A negative gap value indicates that customer satisfaction has not been achieved. These values can also be categorized into different levels of customer satisfaction using the CSIndex. The standard satisfaction levels, as measured through gap analysis with an expectation scale of $H = 5$, is shown in Table 5.

Data collection for the services was based on the theory of service quality. The service indicators comprised six dimensions of service quality: tangibles, reliability, responsiveness, assurance, empathy, and credibility.

The results of the gap analysis and CSIndex for each dimension are presented in Table 6.

Table 5. Gap analysis satisfaction level standards

Gap	Satisfaction Level
> 0,00	Very satisfied
-0,75 ≤ Gap ≤ 0,00	Satisfied
-1,50 ≤ Gap < -0,75	Fair
-2,25 ≤ Gap < -1,50	Not satisfied
Gap < -2,25	Very dissatisfied

Table 6. Results of gap analysis and CSIndex

Dimension	Expectations	Perception	Gap	Satisfaction Level
Tangible	3,933	3,563	-0,370	Puas (P)
Reliability	3,989	3,607	-0,381	Puas (P)
Responsiveness	4,067	3,707	-0,360	Puas (P)
Assurance	4,017	3,700	-0,317	Puas (P)
Empathy	4,144	3,733	-0,411	Puas (P)
Credibility	4,083	3,733	-0,350	Puas (P)
Rata-Rata	4,039	3,674	-0,365	Puas (P)

Based on the gap values in Table 6, the results obtained show negative gap values for all satisfaction dimensions starting from physical appearance, tangible, reliability, responsiveness, assurance, empathy, and credibility. This indicates that the quality values for these dimensions still do not meet customer expectations.

If the gap values are grouped based on satisfaction level, the CSIndex produces a satisfaction level of "satisfied" for each dimension. These results are consistent with the overall assessment of satisfaction. This can be interpreted as meaning that all container customers perceive the services provided by PT Kaltim Kariangau Terminal as having met their expectations overall, but they are still not optimal in each dimension. Table 6 also shows that the empathy dimension has the largest gap value, (-0.411), compared to other customer satisfaction dimensions, so this dimension needs to be further evaluated by the company.

The level of satisfaction from the indicators in each dimension of customer satisfaction can be explained in more detail. Each dimension is explained from the average of expectations and perceptions for each indicator used.

The average value of the service expectations desired by customers describes the respondents' hopes for the future to be able to experience or accept the reality of service aspects that are in accordance with their desires and needs. In describing customer expectations, there are 5 ranges of service level values for customers in Table 7.

Table 7. Range of service level values

Value Range	Service Level	
	Expectations	Reality
0 - 0,99	Not important	Very Poor
1 - 1,99	Not too important	Poor
2 - 2,99	Quite important	Acceptable
3 - 3,99	Important	Very Good
4 - 4,99	Very Important	Very Good

4.2.1 Tangible dimension

The results of calculating the average expectations and reality in the dimensions of tangibles are presented in Table 8.

Table 8 illustrates that the indicator X05 (adequate number of administrative officers, tally operations, and TKBM) has the highest average expected value, 4.067. These results show that the X05 indicator is the most important aspect expected by customers from the physical appearance dimension (tangibles). Therefore, customers expect improvements in this area.

Table 8. Average expectations and reality of tangible dimensions

	Indicators	Expectations	Reality
X01	Suitability of ship wharf conditions	3,933	3,833
X02	Container stacking yard is adequate and feasible	3,933	3,433
X03	The container stacking yard is neatly arranged	4,000	3,733
X04	The appearance of the officers in the field is good and communicative	4,000	3,833
X05	Sufficient number of officers (administration, operational tally, and TKBM)	**4,067**	3,700
X06	The condition of loading and unloading equipment at the terminal (forklift, RS, SL, HT, RTG, CC) is good and well maintained	3,767	3,067
X07	The number of loading and unloading equipment at the terminal (forklift, RS, SL, HT, RTG, CC) is adequate	3,800	**3,300**
X08	Information boards are available well and adequately	3,933	3,633
X09	Public facilities are in good condition and adequate	3,967	3,533

The average perception of service reality in the tangibles dimension reveals that customers consider the service for indicator X07 (the adequacy of loading and unloading equipment at the terminal, including forklifts, RS, SL, HT, RTG, and CC) to have an average reality score of 3.300. This indicates that X07 represents the lowest aspect of service reality compared to other indicators as perceived by respondents. However, overall, these six indicators are considered adequately implemented, as they fall within the service level reality range of 3.00 to 3.99.

Figure 3. Gaps in indicator of tangible dimension

Figure 3 illustrates that the indicator perceived as the most unsatisfactory by customers is X06 (the condition of loading and unloading equipment at the terminal, including forklifts, RS, SL, HT, RTG, and CC), which has the largest gap value of -0.7. In contrast, indicator X01 (the condition of ship wharf suitability) shows the smallest gap value of -0.1, making it the most satisfactory aspect for customers.

4.2.2 Reliability dimension

The results of calculating the average expectations and reality in the reliability dimension are presented in Table 9.

Table 9 illustrates that indicator X17 (ease of the payment system) has the highest average expectation score, namely 4.233. This result indicates that X17 is the most critical aspect expected by customers in the reliability dimension. Therefore, customers prioritize improvements in this indicator.

Table 9. Average expectations and reality of reliability dimensions

	Indicators	Expectations	Reality
X10	Compliance with the ship's docking schedule at the pier	4,000	3,567
X11	Compliance with ship loading and unloading schedules	3,967	3,467
X12	The services of wharf and field tally operational officers are fast and precise	3,933	3,500
X13	Administrative officers provide services quickly and precisely	4,033	3,767
X14	TKBM officers are adequate and skilled in providing services	3,933	3,600
X15	Loading and unloading equipment has high productivity	3,900	**3,367**
X16	Rates are determined based on the services provided	3,800	3,400
X17	Ease of payment system	**4,233**	4,133
X18	Loading and unloading activities are recorded properly and correctly	4,100	3,667

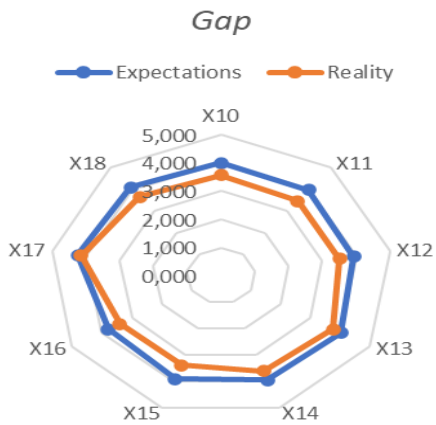

Figure 4. Gaps in reliability dimension indicators

The average reality of service perceived by customers in the reliability dimension indicates that customers rated the service for indicator X15 (loading and unloading equipment having high productivity) with an average reality score of 3.367. This score shows that X15 is the lowest-rated aspect of reality compared to other indicators perceived by respondents. However, in general, eight out of the nine indicators are considered well-implemented, as they fall within the service level reality score range of 3.00–3.99. Meanwhile, one indicator falls within the range of 4.00–4.99, indicating that this aspect is implemented very well.

Figure 4 illustrates that the most unsatisfactory indicator perceived by customers is X15 (loading and unloading equipment has high productivity), with the largest gap value of -0.533. On the other hand, the indicator X17 (ease in the payment system) has the smallest gap value of -0.100, making it the most satisfying aspect for customers.

4.2.3 Responsiveness dimension

The results of the calculations for the average expectations and perceptions in the responsiveness dimension are presented in Table 10.

The average perception of service reality in the responsiveness dimension reveals that customers felt the service for indicator X22 (issues with loading and unloading equipment are resolved quickly and accurately by officers) had an average reality score of 3.300. This indicates that this indicator represents the lowest aspect of reality compared to other indicators perceived by respondents. However, overall, all of these indicators are implemented well, as they fall within the service level reality range of 3-3.99.

Table 10. Average expectations and reality of responsiveness dimensions

	Indicators	Expectations	Reality
X19	Administrative officers provide clear and easy to understand information	**4,167**	3,867
X20	Admin officers are able to provide good and appropriate solutions to administrative problems	**4,167**	3,833
X21	Wharf and field tally operations officers receive and respond to customer complaints quickly	4,000	3,600
X22	Problems with unloading equipment can be resolved quickly and precisely by officers	3,867	**3,300**
X23	Information facilities in the terminal area can be accessed 24 hours	4,133	3,933

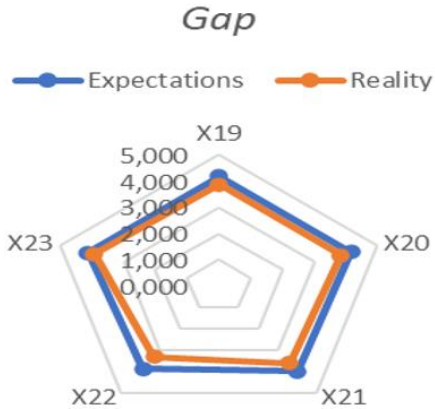

Figure 5. Gaps in responsiveness dimension indicators

Figure 5 illustrates that the most unsatisfactory indicator perceived by customers is X22 (issues with loading and unloading equipment are resolved quickly and accurately by officers), with the largest gap value of -0.567. In contrast, indicator X23 (information facilities in the terminal area accessible 24 hours) has the smallest gap value of -0.200, making it the most satisfying aspect for customers.

4.2.4 Assurance dimension

The results of the calculations for the average expectations and reality in the assurance dimension are presented in Table 11.

Table 11. Average expectations and reality dimensions of assurance

	Indicators	Expectations	Reality
X24	Post security operational officers are responsive to security and order	**4,067**	3,800
X25	Implementation of operations in the field in accordance with the System Operational Procedure (SOP)	4,000	3,733
X26	The regulations are carried out properly and correctly	4,000	3,700
X27	There are strict sanctions if there are deviations from regulations and SOP	4,033	3,633
X28	The wharf and field tally operational officers have competence	3,933	**3,567**
X29	Administrative officers have competence	**4,067**	3,767

The table above illustrates that indicators X24 (post-security operational officers are responsive to security and order) and X29 (administrative officers possess competence) have the highest average expected value, namely 4.067. These results indicate that indicators X24 and X29 are the most important aspects expected by customers within the assurance dimension. Therefore, customers anticipate improvements in these areas.

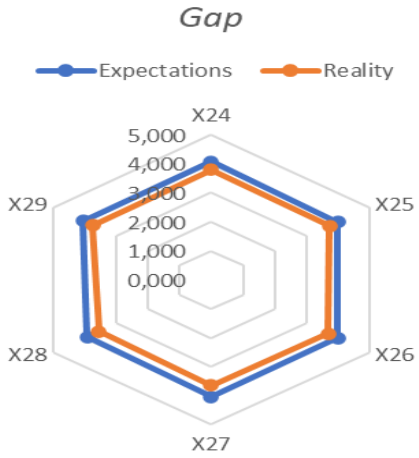

Figure 6. Gaps in assurance dimension indicators

The average reality of service perceived by customers in the assurance dimension shows that the service in indicator X28 (tally operational officers at the dock and in the field possess competence) has an average reality value of 3.567. This indicates that this indicator represents the lowest aspect of reality when compared to other indicators perceived by respondents. However, in general, all indicators in this dimension are well-implemented, as they fall within the service level reality range of 3–3.99.

Figure 6 illustrates that the most unsatisfactory indicator, as perceived by customers, is X27 (there are strict sanctions for deviations from regulations and SOPs), with the largest gap value of -0.400. Conversely, indicators X24 (post-security operational officers are responsive to security and order) and X25 (field operations are conducted in accordance with Standard Operational Procedures (SOPs)) have the smallest gap value of -0.267, making them the most satisfying aspects for customers.

4.2.5 Empathy dimension

The results of the calculations for the average expectations and reality of the empathy dimension are shown in Table 12.

Table 12 illustrates that indicator X30 (terminal administration staff serving in a friendly and polite manner) has the highest average expected value of 4.200. These results indicate that indicator X30 is the most important aspect expected by customers from the empathy dimension. Hence, customers expect improvements in this area.

Table 12. Average expectations and reality of empathy dimensions

	Indicators	Expectations	Reality
X30	Terminal administration officers serve in a friendly and polite manner	**4,200**	3,767
X31	The wharf and field tally operational officers serve in a friendly and polite manner	4,133	3,800
X32	Officers are responsible for customer comfort	4,100	**3,633**

The average reality of service felt by customers in the empathy dimension revealed that customers felt the service for indicator X32 (officers responsible for customer comfort) had an average reality value of 3.633. This indicates that this indicator is the lowest aspect of reality when compared to other indicators perceived by respondents. However, in general, all of these indicators are aspects that are well-implemented because they fall within the service level reality value range of 3 to 3.99.

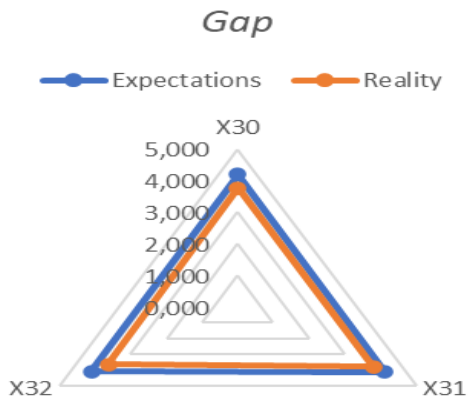

Figure 7. Gaps in empathy dimension indicators

Figure 7 illustrates that the indicator showing the most unsatisfactory experience felt by customers is X32 (officer responsible for customer comfort), with the largest gap range of -0.467. The indicator X31 (tally operational officers at the dock and in the field serving in a friendly and polite manner) has the smallest gap, with a gap of -0.333, which is the aspect that most satisfies customers.

4.2.6 Credibility dimension

The results of the calculations for the average expectations and reality of the credibility dimension are displayed in Table 13.

Table 13. Average expectations and reality of credibility dimensions

	Indicators	Expectations	Reality
X33	Terminal administration officers are honest and trustworthy	4,100	**3,733**
X34	Wharf and field operations officers are honest and trustworthy	**4,133**	3,800

Table 13 illustrates that the indicator X34 (operational officers at the docks and in the field are honest and trustworthy) has the highest average expected value, namely 4.133. These results show that indicator X34 is the most important aspect expected by customers from the empathy dimension. Therefore, customers expect improvements.

The average reality of service perceived by customers in the empathy dimension was found to be that customers felt that the service for indicator X33 (terminal administration officers were honest and trustworthy) had an average reality value of 3.733. This shows that this indicator is the lowest aspect of reality when compared to other indicators perceived by respondents. However, in general, all of these indicators are aspects that are implemented well because they fall within the service level reality value range of 3-3.99.

Figure 8 illustrates that the sequence showing the most unsatisfactory indicators felt by customers is X33 (honest and trustworthy terminal administration officers) with the largest gap range, namely -0.367. Indicator X34 (operational officers at the docks and in the field are honest and trustworthy) has the smallest gap, namely -0.333, which is the aspect that most satisfies customers.

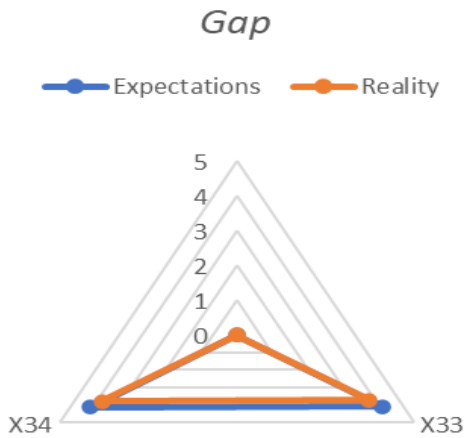

Figure 8. Gaps in credibility dimension indicators

The results of this study reveal a negative gap across all service quality dimensions, indicating that customer perceptions of the service fall short of their expectations. This finding is consistent with the studies by Dananjoyo et al. [28] and Hemalatha et al. [24], which also highlighted reliability and responsiveness as key areas requiring improvement in the logistics and port sectors. However, this study differs from Ugboma et al. [21], who found responsiveness to have the largest gap. In contrast, this study identifies the empathy dimension as having the largest gap. This variation may be due to the specific challenges related to customer comfort at the Kariangau Terminal.

Based on the analysis results, the average gap across all customer satisfaction dimensions was found to be -0.365, indicating that the quality of these dimensions does not yet meet customer expectations. The empathy dimension has the largest gap value, -0.411, compared to other dimensions, suggesting that this area requires attention from the company. When the average gap is categorized according to the CSIndex satisfaction level, it falls within the "satisfied" category. This differs from the findings of Ugboma et al. [21], which identified the responsiveness dimension as having the largest gap (-1.50).

The significant gap in the empathy dimension observed in this study may be due to the limited direct interaction between staff and service users, which is particularly important at a high-volume terminal like Kariangau. Furthermore, internal factors, such as the training levels and customer service awareness of staff, could also affect user perceptions. This aligns with the findings of Vu et al. [23], which highlight that staff training and enhanced empathy are critical factors for improving service quality in terminal and port environments.

5. CONCLUSIONS

The study findings indicate that the overall service quality at Kariangau Container Terminal has not yet fully met customer expectations, as evidenced by the negative gap values across all measured service dimensions. The most significant gap was found in the Empathy dimension, with a gap of -0.411, indicating that customers feel there is a lack of personal connection and responsiveness from the terminal staff. This dimension, which encompasses staff friendliness, communication clarity, and attention to user comfort, should be prioritized in service improvement efforts. Enhancing this aspect would likely improve customer satisfaction, as users generally value more empathetic and attentive interactions.

The Reliability dimension, which measures factors such as schedule adherence, service accuracy, and consistency, also showed a notable negative gap of -0.381. This suggests that there are challenges in maintaining consistent operational performance, particularly in adhering to expected timelines and delivering services precisely as promised. To address this issue, the terminal management should implement strategic improvements to ensure better punctuality, accuracy, and consistency in service delivery. Addressing these issues effectively could lead to higher user satisfaction, as reliability is often a critical factor in users' perceptions of service quality.

Although the Customer Satisfaction Index (CSI) categorizes the overall service quality as 'satisfactory,' the existence of negative gaps across all six service dimensions—Tangibles, Reliability, Responsiveness, Assurance, Empathy, and Credibility—highlights a considerable potential for

quality enhancement. To achieve optimal service levels, management should adopt a targeted improvement strategy focusing on the dimensions with the most significant gaps. By implementing systematic training programs, refining service procedures, and actively monitoring user feedback, Kariangau Container Terminal can foster stronger trust and loyalty among customers.

By addressing these identified gaps and enhancing service delivery, Kariangau Container Terminal can strengthen its strategic role as a key logistics hub supporting the economic development of the new capital region and East Kalimantan. This focused and structured approach to service improvement can contribute to better customer experiences, stronger user trust, and long-term loyalty, ultimately positioning the terminal as a more competitive and reliable player in the logistics industry.

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