



Research Article

Service excellence at sea: User satisfaction with Belawan Samudera Fishing Port, Indonesia

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Article information	Abstract
Received: January 12, 2024 Revision: June 18, 2024 Accepted: June 22, 2024	The aim of this study was to assess the influence of service quality on user satisfaction at Belawan Samudera Fishing Port, Indonesia, a critical hub of fish logistics and supply chain in the Malacca Strait. The study used a mixed-method approach by combining surveys, observations, and in-depth interviews with key informants, and was conducted in August and September 2023. The evaluation of the fishing port service quality was based on five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. The study involved a total of 66 respondents with an overall satisfaction rating of 75.5 %, indicating that users generally provided positive feedback. However, three port facilities did not meet the standards of the Minister of Maritime and Fisheries Affairs Decree Number 8 of 2012. The study showed deficits in the empathy and assurance aspects, and focus on enhancements to increase customer satisfaction is proposed. This study highlighted that optimizing operational efficiency and user satisfaction required improvements in regulatory compliance and quality management at the fishing port.
Keywords Belawan; CSI; Satisfaction; Fishing port; Service	

1. Introduction

Customer satisfaction analysis is one of the important aspects of business operations, including fishing port management, which serves both commercial and administrative functions. The interaction of service quality and customer satisfaction has been extensively studied using various analytical models, such as SERVQUAL, a well-known framework for assessing service quality, the Customer Satisfaction Index (CSI), the Analytic Hierarchy Process (AHP) model, and the KANO model (Allen, 2004; Neysi & Dadkhah, 2013; Mollaoglu et al., 2023). Many studies have utilized the SERVQUAL methodology to obtain deeper knowledge of service quality and customer satisfaction, such as in public transportation studies (Barabino et al., 2012; Sam et al., 2018). These illustrate how certain modifications to SERVQUAL might improve customer satisfaction and propose more options of environmentally friendly transportation inside urban areas. Barabino et al. (2012) made SERVQUAL more applicable to urban bus networks by including crucial elements such as sanitation and punctuality. Sam et al. (2018) resolved significant gaps between expected and real service quality in Kumasi's buses, particularly in terms of safety and reliability. In addition, the CSI becomes a crucial approach for assessing consumer satisfaction and offers essential knowledge that facilitates ongoing enhancement and strategic decision-making, as well as fostering a customer-centric business environment (Rust & Zahorik, 1993; Anderson & Fornell, 2000; Mittal & Kamakura, 2001). The

significance of customer satisfaction in port management cannot be exaggerated due to its direct impact on the service excellence and the overall effectiveness of port operations.

A comprehensive perspective on the various facets of port operations, including customer satisfaction, decision-making, and service quality, has been provided by a few studies (Ha, 2003; Cho et al., 2010; Lu et al., 2011; Dinwoodie et al., 2011). Each study offers a unique perspective that improves the overall understanding on how ports may optimize their operations, as well as strategic decision-making in a rapidly evolving and competitive industry. Based on their study in Incheon and Shanghai, Cho et al. (2010) contributed important additions to our understanding of how consumer satisfaction and post-purchase behaviors were directly influenced by cognitive judgments of the service quality of the ports. They highlighted the need for continuous improvement of the port service to meet and exceed customer expectations, resulting in fostering client loyalty and increasing the tendency of customers to choose the same port again. Similarly, Ha (2003) evaluated the service quality of well-known container terminals, and specifically focused on those located in Korea. The study created benchmarks and identified crucial aspects of service quality that were essential for maintaining competitiveness. In addition, Lu et al. (2011) reported an empirical study into the continuing discussions about container terminals. The objective was to identify the specific service features which were highly valued by customers and to highlight the importance of developing targeted improvements in service delivery. Port users who are satisfied tend to endorse and participate in sustainable practices and development activities promoted by the port (Dinwoodie et al., 2011).

Although fishing ports play a crucial role in the management of fish products, due to their need for a complete service for processing, unloading, and distribution, there are few studies on fishing port service performance. Some of these studies found that improvements in customer satisfaction at coastal fishing ports through the provision of amenities, as well as service quality, was necessary (Putera et al., 2022; Nur et al., 2023). To facilitate fishery activities, fishing ports must have essential specifically designed infrastructures for the handling, as well as the administrating, of catches and related business. Optimizing port facilities should be carried out with a specific emphasis on their specific functions. Assessment of port facilities state and provisions is an important activity for the continuous improvement of fishing port facilities, functions, and services. To obtain sufficient port facilities and effective port functions, for both the administration of fisheries activities and business operations, it is crucial to have comprehensive knowledge about the performance of port services. This study specifically observed the satisfaction levels between fishing port users toward the facilities and services provided at Belawan Samudera (Ocean) Fishing Port (PPS Belawan), Indonesia, as one of the most important fishing ports in the Malaka Strait of Indonesia. Thus, the objective of this study was to measure user satisfaction and determine certain areas that need to be improved to ensure the provision of excellent port services.

2. Materials and methods

The research was conducted at the Belawan Samudera Fishing Port (PPS Belawan), located at 3° 46'22.50" N and 98° 41' 59.33" E geographic coordinates, and 27 km from the center of Medan City, North Sumatra (**Figure 1**). The port was established in 1975, and was known as PK Gabion before being finally handed over to the authority of the Department of Agriculture on 22 May 1978, and designated by the Minister of Agriculture as the Belawan Nusantara Fishing Port. On 1 May 2001, its classification was officially changed to Belawan Samudera Fishing Port. Now, it covers an operational area of 54.95 ha. Inside this fishing port area, there is a privately owned entity, known as *tangkahan*, which serves as place for fish catch landing and a warehouse, in addition to a government-managed fish landing place. Both entities are expanding and coexisting.

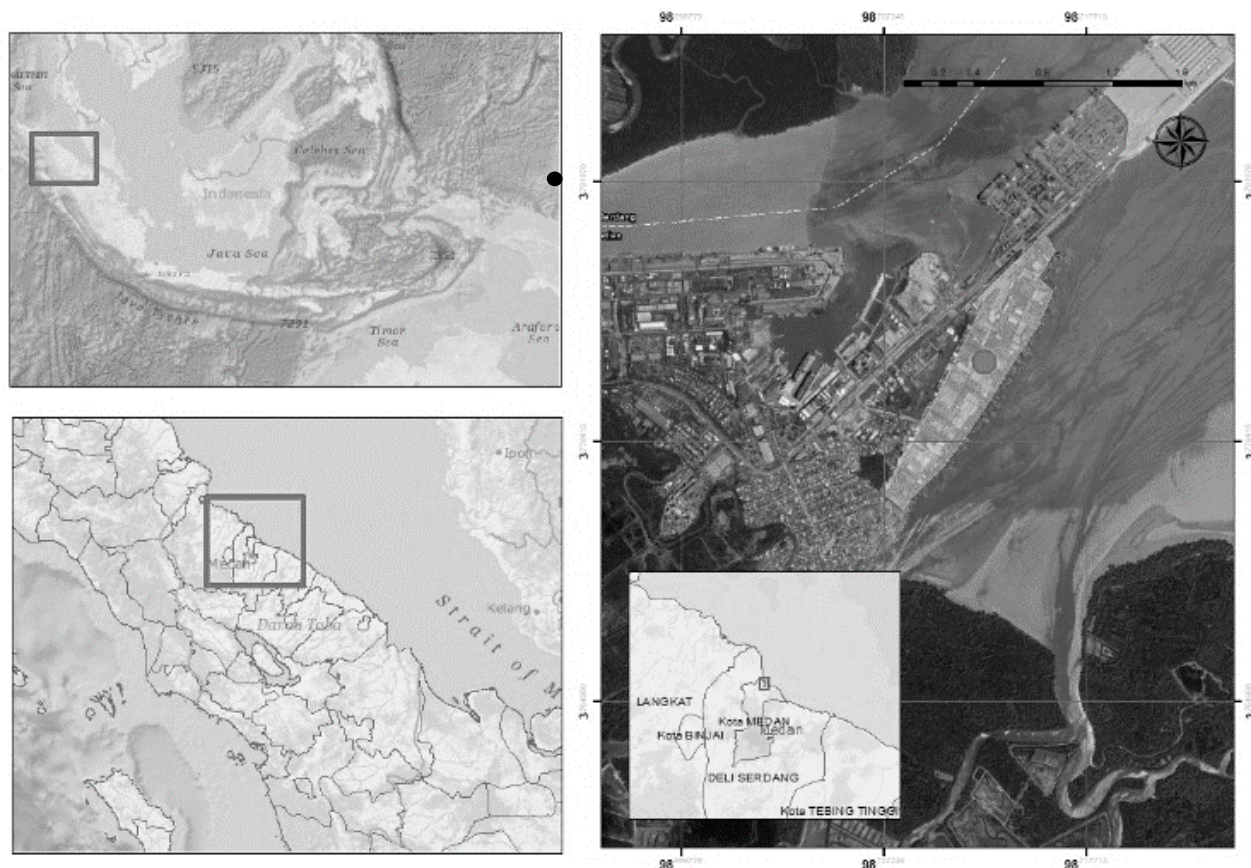


Figure 1 Location of Belawan Samudera Fishing Port (Source: Google Earth Pro).

This research combined survey and descriptive statistical analysis to describe the data and examine the relation between variables within a specific sample (Marczyk et al., 2005). In the survey, selected respondents from port users were asked about their behaviors, attitudes, and opinions about port facilities and services. The purposive random sampling technique, a common method in qualitative research, was used to select the respondents. This method is frequently used when constraints such as time, resources, or restricted access prevent the researchers from collecting data from the entire population (Arsovska, 2012). The survey was given to 66 selected respondents, consisting of two classification groups: 1) 50 respondents who were users, from both the *tangkahan* and the public fishing port, who were interviewed using a pre-established questionnaire on fishing port facilities, function, and services; and 2) 16 respondents who were port managers, holding various positions such as operational coordinator, operational sub-coordinator, head of finance sub-division, sub-coordinator of facilities and infrastructure management, sub-coordinator of business services, secretary of the port, and port staffs. The second group of respondents participated in an in-depth interview. Prior to the analysis process, the data were taken for validity and reliability tests to ensure the accuracy and consistency of the results. The bivariate Pearson correlation tests were applied for the measures validity assessment, and Cronbach's Alpha was used for the internal consistency of the scales analysis. All resulting values were greater than the standard threshold of 0.7, which indicated high reliability. In addition to survey data, the study utilized observational data and secondary data gathered from fishing port statistics.

Using a well-defined rating system, this survey employed a Likert scale to assess the level to which respondents held specific opinions (Gideon, 2012). This scoring method was used to quantify the perceptions and perspectives of each respondent on port functions, facilities, and services, utilizing a structured questionnaire. The Likert scale employs multiple statement items to assess

individual behavior by eliciting responses on a 5-point scale for each item, ranging from “very bad”, scored as 1, to “very good”, scored as 5.

A hierarchical composite can be viewed as an additional measure of the collected data, which is achieved by organizing individual indicators into distinct categories and, subsequently, combining these categories to form an aggregate variable (DeVellis & Thorpe, 2021). This research further evaluated two aspects of fishing port management: 1) the quality of port infrastructure and functions, and 2) the quality of fishing port services.

2.1 Analysis of port facilities and functionality

Based on the current standard of fishing port facilities in Indonesia, as stated in KKP (2012), the quality of port facilities and functions was evaluated using cumulative calculations of 15 indicators (Q_i). The indicators consisted of 5 basic facility indicators, 7 functional facility indicators, and 3 supporting facility indicators (**Table 1**). Each statement was filled in by 50 respondents (St), based on a scale of 1 (very poor) to 5 (very good). Total responses given by respondents were then calculated by multiplying the number of statements (Q_i) of 15 indicators by the number of respondents (St) of 50 respondents to obtain a total value (N_t) of 750. The maximum score from all respondents' responses (Y_m) was obtained from multiplying the highest Likert scale (scale 5) by the total number of responses (N_t) and, thus, the Y_m score was calculated as 3,750. Then, the total facility score (T_f) was calculated using the following formula: $T_f = \sum (R_n \times P_n) = (R_1 \times P_1) + (R_2 \times P_2) + (R_3 \times P_3) + \dots + (R_n \times P_n)$, where T_f , R_n , and P_n were the total facility score, the number of respondents who chose a certain scale score on the Likert scale, and the selected Likert scale value, respectively.

Table 1 The standard of fishing port facilities, based on the Ministry of Marine Affairs and Fisheries Decree of 8/2012.

Fishing Port Facilities		
Basic Facilities	Functional Facilities	Supporting Facilities
1. pier	1. beacon sign	1. toilet facilities
2. shipping lanes	2. administration office	2. kiosk and shops
3. roads and drainage	3. maintenance space	3. fishermen's meeting hall
4. jetty	4. waste processing plant	
5. harbor pool	5. garbage dump	
	6. watchtower	
	7. fish auction (TPI)	

Source: KKP (2012)

The availability level of fishing port facilities was determined using a 5 classes system, assigned based on specific percentages within different intervals. In this scenario, the interval calculation is determined by using the interval formula (I), which is obtained by dividing the highest value of the category (100) by the maximum number of Likert scale scores measured (5), resulting in (I) equal to 20. The quantification of the availability category of the facility is presented in **Table 2**.

Table 2 Reference standard for availability assessment of fishing port facility.

Assessment Interval (%)	Category
0 - 19.9	Very Poor
20 - 39.9	Poor
40 - 59.9	Fair
60 - 79.9	Good
80 - 100	Very good

2.2 Analysis of port services quality

Port services quality was analyzed by applying the SERVQUAL method. This method measures the gap between the expectations and the reality of the service received by users by applying five dimensions of service quality: 1) direct evidence (tangible), 2) reliability, 3) responsiveness, 4) assurance, 5) empathy (Parasuraman et al., 1988). Each dimension has different variable indicators, and this study applied 21 different service variables. Such a method is useful for measuring service quality in a specific context, including in port management (Thai, 2016; Ugboma et al., 2004).

The analysis of service quality was further conducted by measuring customer satisfaction utilizing the CSI model. The CSI measuring process involved the following phases:

1) Calculating the Mean Importance Score (MIS) and Mean Satisfaction Score (MSS). The MIS is determined by calculating the average of importance scores assigned to a particular attribute, while MSS refers to the average rating of user satisfaction on the service performance.

2) Computing the Weighting Factor (WF), which is determined by calculating the average of importance score or the average score of each characteristic, and is expressed as a percentage of the overall average importance score or average score for all qualities examined.

3) Calculating the Weighted Score, which is a function of the average satisfaction score or the average score of satisfaction level for each attribute multiplied by the Weighting Factors (WF) of each attribute.

4) Calculating the CSI value, which is determined by using the formula: $CSI = \sum WS / HS \times 100 \%$. Meanwhile, $\sum WS$ and HS (High scale) are the total Weight score value and the maximum value of the measurement scale, respectively. **Table 3** presents the CSI assessment intervals.

Table 3 CSI assessment interval.

CSI values	Interpretation
$0 < CSI \leq 20 \%$	Very Dissatisfied
$20 \% < CSI \leq 40 \%$	Dissatisfied
$40 \% < CSI \leq 60 \%$	Fairly satisfied
$60 \% < CSI \leq 80 \%$	Satisfied
$80 \% < CSI \leq 100 \%$	Very satisfied

3. Results and discussion

3.1 Profiles of respondents and Belawan Samudera Fishing Port

The total sample size included 66 respondents of 46 males and 20 females. Respondents' educational levels included high school level (55 %) as the most common, followed by diploma and bachelor (36 %), junior high school (6 %), and postgraduate (3 %). Most of them were in productive age groups, ranging from 15- to 64-year-old based on Statistic Indonesia (BPS, 2022).

The PPS Belawan is categorized as a Type A port, which is the highest classification for fishing ports in Indonesia. Specifically, its purpose is to accommodate fishing vessels larger than 60 GT, and has a capacity for up to 100 fishing vessels. The port is administered on an area of more than 50 hectares. Within the fisheries management framework in Indonesia, this fishing port is exceptional. It accommodates both publicly and privately owned facilities. Private entities that primarily operate most warehouses within the operational area of the port are popularly known as *tangkahan*. They are owned by either individuals or organizations and manage most of fish business processes in the port area. *Tangkahan* thus serve as both temporary fish storage facilities and primary locations for post-harvest fishery activities inside the port area. These activities include fish loading and unloading, as well as sorting and categorizing based on species, sizes, or quality. This shows that *tangkahan* are an important component of the supply chain at PPS Belawan, providing temporary storage solutions for the fisheries sector (Speir et al., 2014). However, their presence within a governmental management

fishing port has the potential to disrupt basic port functions, especially those related to the fishing port administration function and services. Such an issue often arises in discussions and debates. Therefore, any operational activity carried out by *tangkahan* required authorization and compliance with procedures applied by the government, such as sailing permits and logistical preparation activities. Nevertheless, regarding the port facilities, many *tangkahan* owners prefer to provide their own facilities themselves in their respective warehouses for various reasons, such as insufficient port capacity and long queues for the fish unloading process.

The fish total production in PPS Belawan reached 17,114 tons in 2022. The average fish production within 2018 to 2022 accounted for 19,810 tons, with a total value of IDR 561,059,334,232 (1 US dollar rate at 16,160 Indonesian Rupiah, IDR). The highest recorded number of visits was 8,249 in 2019, with average visits of 7,151 over the last 5 years. **Table 4** illustrates fish production and fishing vessels at the Belawan Samudra Fishing Port from 2018 to 2022.

Table 4 Fish production at Belawan Samudera Fishing Port within 2018 - 2022.

Year	Production		Vessels		Productivity (Tons/visit)	Trends (%)
	Volume (Tons)	Value (Indonesia Rupiah)	Number of Vessels	Frequency of Visits		
2018	21.821	613.567.452.120	454	7.748	2.82	0.00 %
2019	21.853	640.811.710.000	558	8.249	2.65	-8.36 %
2020	18.944	415.043.413.400	525	5.882	3.22	28.58 %
2021	19.320	552.082.224.724	494	6.713	2.88	-17.13 %
2022	17.114	583.791.870.917	446	7.164	2.39	-24.46 %
Average	19.810	561.059.334.232	495	7.151	3	-4.27 %
Max	21.853	640.811.710.000	558	8.249	3.22	28.58 %
Min	17.144	415.043.413.400	446	5.882	2.39	-24.46 %

3.2 Analysis of availability of facilities and services quality

The main objective of a fishing port, as a public asset, is to effectively fulfill the needs of the fishing community (Nurhayatin et al., 2016). User satisfaction is contingent upon the level of services provided. Service quality encompasses all efforts to meet the needs and preferences of clients or service users, in addition to ensuring precise and timely delivery to establish a harmonious alignment. Based on the Indonesian Fishing Port Management Regulations (KKP, 2012), PPS Belawan has five basic facilities, seven functional facilities, and three supporting facilities. Fifty respondents, the main users of the fishing port, evaluated each of these facilities, as presented in **Table 5**.

Table 5 shows the results of user evaluation on port facilities, indicating that functional facilities have the highest score of 748 points, and basic facilities of 725 out of the total score of 1,962. The scores were computed using an index and an interval scale formula, offering a systematic evaluation of each category, and resulting in 58 % (fair), 59.84 % (fair), and 65.2 % (good) quality ratings for basic, functional, and supporting facilities. Although the supporting facilities received a higher score, the total quality score was 54.88 % (fair), indicating a pervasive need for improvement

in all areas. The unequal distribution of quality among various categories of facilities is illustrated by the disparity between the superior rating of supporting facilities and the comparatively lower rating of the overall facility. To achieve a more universally exceptional and equitable level of quality in all operational domains, future endeavors should prioritize the enhancement of basic and functional facilities.

Table 5 Valuation on availability of Belawan Samudera Fishing Port facilities.

Respondent Category	Basic Facility Analysis					Total Score
	VP (RxPn)	P (RxPn)	F (RxPn)	B (RxPn)	VG (RxPn)	
<i>Tangkahan</i>	6	44	561	20	0	725
General	0	0	78	16	0	
Total Score of Each Group	6	44	639	36	0	
Respondent Category	Functional Facility Analysis					Total Score
	VP (RxPn)	P (RxPn)	F (RxPn)	B (RxPn)	VG (RxPn)	
<i>Tangkahan</i>	0	16	624	16	0	748
General	0	0	84	8	0	
Total Score of Each Group	0	16	708	24	0	
Respondent Category	Supporting facility Analysis					Total Score
	VP (RxPn)	P (RxPn)	F (RxPn)	B (RxPn)	VG (RxPn)	
<i>Tangkahan</i>	0	6	306	88	25	489
General	0	0	33	16	15	
Total Score of Each Group	0	6	339	104	40	
Total						1,962
Remarks:						
VP	: Very Poor					
P	: Poor					
F	: Fair					
B	: Good					
VG	: Very Good.					

A further analysis of the service quality provided by PPS Belawan was conducted. The bivariate Pearson correlation analysis was employed for a validity test. The correlation coefficients ranged from 0.246 to 0.630, all of which were statistically significant at the alpha of 0.05 (2-tailed). This data showed the presence of strong positive correlations between the constructs. The reliability of the data was evaluated using Cronbach's alpha and calculated at 0.92, which indicated a sufficient internal consistency across the different scales. The results of the SERVQUAL analysis is presented in **Table 6**.

Table 6 Scores of port service quality.

Variable	No	Indicator Variables	Average Values		GAP	Rank
			Performance Scores	Satisfaction Scores		
Direct Evidence (Tangible)	1	Entrance Access to <i>Tangkahan</i>	3.58	3.08	-0.50	34
	2	Port Cleanliness	3.04	3.04	0.00	14
	3	Availability of fishing port facilities				
		Basic	3.14	3.18	0.04	3
		Functional	3.12	3.16	0.04	3
		Support	3.14	3.18	0.04	3
	4	Administrative office	4.02	4.12	0.10	1
Reliability	5	Implementation of harbor mastership				
		Proof of sailing	3.96	3.94	-0.02	24
		STB	3.96	3.96	0.00	14
		Technical and nautical inspection	3.94	3.94	0.00	14
		Logbook	3.96	3.96	0.00	14
	6	Quality development and fishery products				
		Catch fish checking	3.94	3.90	-0.04	29
		CPIB (fish handling practices)	3.92	3.90	-0.02	24
	7	Catch fish data collection	3.96	3.96	0.00	14
	8	Logistics and supplies services				
		Easiness	3.98	3.98	0.00	14
		Quickness	3.96	3.98	0.02	8
	9	Utilization of facilities and land				
		Basic	3.68	3.62	-0.06	30
		Functional	3.68	3.62	-0.06	30
		Support	3.68	3.60	-0.08	32
Responsiveness	10	Loading and unloading services	3.92	3.94	0.02	8
	11	Transportation and parking facilities	3.84	3.72	-0.12	33
	12	Facility improvements	3.50	3.48	-0.02	24
	13	Speed of service performance				
		SHTI (catch certificate)	3.94	3.98	0.04	3
		Mooring	3.94	3.96	0.02	8
		Fuel recommendation letter	3.96	3.98	0.02	8
	14	Logistics services	3.92	3.92	0.00	14
	15	Area monitoring				
		cleanliness	3.74	3.72	-0.02	24
		Water quality	3.74	3.72	-0.02	24

Table 6 (continued) Scores of Port service quality.

Variable	No	Indicator Variables	Average Values		GAP	Rank
			Performance Scores	Satisfaction Scores		
Assurance	16	Environmental security and fisheries activities				
		Territory patrol	3.56	3.56	0.00	14
		Fisherman safety	3.50	3.54	0.04	3
	17	Fuel provision	3.96	3.98	0.02	8
	18	Water and ice provision	4.00	4.06	0.06	2
Empathy	19	Service procedures	3.98	3.98	0.00	13
	20	Relations with port and <i>Tangkahan</i>	4.00	4.00	0.00	14
	21	Response to suggestions and complaints	3.96	3.96	0.00	14

As seen in **Table 6**, the current evaluation conducted at Belawan Samudera Fishing Port presents an in-depth review of service shortcomings, uncovering a varied picture of service excellence. The administrative office received the best score, at an average performance rating of 4.02, indicating a high level of administrative efficiency. Conversely, the *tangkahan* port entry received the lowest rating, with 3.58 on average, indicating a substantial need for changes in this aspect. An in-depth analysis on the 21 services provided by the port by using CSI resulted in a CSI score of 75.5 %. These results indicated that most users were satisfied with the services provided. The reliability and responsiveness aspects stood out as the most influential factors in determining satisfaction, as shown in **Figure 2**. To address the variation in satisfaction levels among services, it is suggested that the port authorities prioritize the enhancement of the access facilities at the *tangkahan* entry point. It is anticipated that the port's operational efficiency and user satisfaction will be improved through the streamlining of operations and infrastructure improvements.

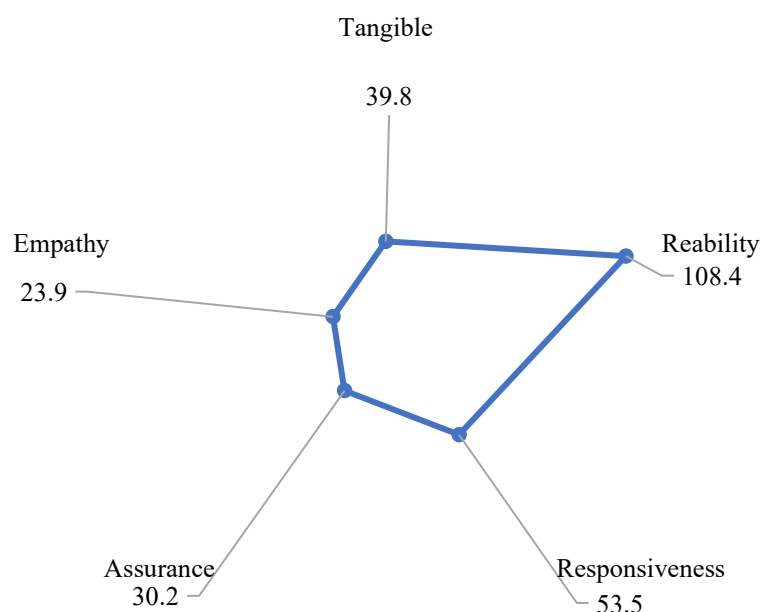


Figure 2 Satisfaction value of Belawan Samudera Fishing Port service users.

Figure 2 shows that the reliability factor has a considerable impact on user satisfaction, surpassing other aspects of service quality at PPS Belawan. This finding is supported by detailed interviews with key informants, who praised the port effectiveness in supporting operational activities, especially with *tangkahan* respondents. They notably emphasized the convenience of the administrative processes and the fulfillment of logistics. The current CSI of 75.5 %, indicates users are positioned at a level of satisfaction. Nevertheless, empathy and assurance dimensions still have the potential for improvements. The general port users were mostly influenced by the caliber of the port infrastructure, which were different from *tangkahan* users, who relied on their own facilities. The absence of proper sanitary conditions in the market and the floods during high tides often dissuade people from engaging in auctions. This emphasized the urgency of functional facilities improvements to ensure the quality and marketability of catches. Partnership with *tangkahan* was maintained by PPS Belawan particularly for the business function of the fishing port, by ensuring *tangkahan* were reliable for certain business duties aligning with port standards of administrative activities and, thus, leading to streamlined operations. Although such a management approach is acceptable, improving the underlying infrastructure is critical in order to achieve efficient fishing port management.

3.3 Discussion

The analysis of the PPS Belawan facilities shows a substantial lack of infrastructure availability and quality. Three essential facilities were found damaged, and one facility did not comply with the Fishing Port regulation of Indonesia (KKP 2012), mainly due to the absence of a suitably long pier. The existing fishing port pier was only 153.6 meters in length, compared to the required length of 300 meters. The in-depth discussion with the Head of Operational Sub-Coordinator identified that the facilities were in a considerably damage state due to tidal flooding. This has particularly affected the main access to the storage area, which is now in a condition of disrepair, as well as access to key utilities. The roadways in the vicinity of the port are heavily burdened with water-filled potholes, in addition to shipping routes being utilized for fishing by artisanal fishermen that worsens road, maintaining difficulties because it obstructs the passage of larger fishing vessels. Therefore, fishing ports managers are required to actively adjust to evolving infrastructures having more capability in improving fishing operations and overall port effectiveness. This study also highlighted facilities and service quality that play a vital role in ensuring user satisfaction at fishing ports. Thus, to cope with these problems, it is suggested that port authorities should prioritize infrastructure repair, particularly in regions with the worst impacts. The port manager also needs to consider renovating the facilities commonly utilized by artisanal fishers to prevent their, and other, activities from any interruptions. By upgrading these facilities, not only would the adherence to rules would be ensured, but the satisfaction and safety of all port users would also improve.

Customer satisfaction has been determined as significantly influenced by service quality. Consumers evaluate the level of service excellence by considering a variety of factors, including the character of the service (Thai, 2016). These criteria are crucial in various service sectors, as was also found in this study, which include: (a) Tangible aspects - observable physical attributes of facilities and equipment; (b) Reliability - the company's capacity to deliver services accurately and consistently; (c) Responsiveness - the speed and promptness of service delivery in meeting user expectations; (d) Assurance (often referred to as 'guarantee') - the knowledge, courtesy, and competence of staff to cultivate trust and confidence in the service; and (e) Empathy - the provider's efforts to comprehend and address the specific needs of users (Rangkuti, 2006). Considering the changing demands of customers, it is essential for service providers (the port manager) to consistently evaluate and improve these aspects. Gaining a more profound comprehension and application of these standards of excellence can result in enhanced consumer confidence and allegiance, particularly in fiercely competitive industries. Port managers should consider employing innovative approaches to

consistently evaluate and enhance these service dimensions, in order to maintain a high level of service quality and meet the changing expectations of clients.

The provision of sustainable operational services and a more favorable customer experience were significantly attributed to the prompt responses and the effective management of production and administrative tasks (Bae, 2016). The specific assessments show a discrepancy in operational effectiveness; despite overall satisfaction with port services, as shown in the obtained high score, the overall port function received 76.7 %, and low scores were achieved by business and government functions of 29.6 and 38.1 %, respectively. One of the main issues with operations is the considerable distance that separates the pier from *tangkahan* (warehouses), requiring the need for extra vehicles for transportation, which consequently raises the cost and inefficiency of operations. To address these challenges, it is important for the port management to improve logistics management, and even modify the port layout. Such strategies might reduce the distances of transported fish commodities. Implementing such upgrades will ensure the continued high level of customer satisfaction and the port's reputation for providing excellent services, while also improving the operational efficiency of the port's administrative and business functions.

The port's satisfaction level of 75.5 % indicated generally satisfied users. The feature receiving highest favorable rating is the reliability. Although the performance is commendable, there is still much scope for enhancing empathy and certainty, which are crucial for attaining a higher satisfaction index. In response, the port management has streamlined administrative services for *tangkahan* operators, ship owners, and public consumers. In addition, they introduced an expedited reporting system and streamlined logistics procedures to enhance sailing operations. Furthermore, efforts have been made to restore and revitalize damaged infrastructures, although the progress has been quite slow. Several *tangkahan* owners have addressed the sluggish progress of upgrades by independently building their own docks, for the purposes of decreasing operational expenses and circumventing any delays. Moreover, the existence of artisanal fishing boats has caused disputes in shipping routes, emphasizing the necessity of cultivating constructive, cooperative connections between the port and its various users to improve shared operational effectiveness. To maintain a continually excellent user experience and efficient use of the port's facilities, it is crucial to prioritize continuous development and improvement of the infrastructure. This should include a particular emphasis on expediting facility repairs and enhancing communication methods with the stakeholders.

The user satisfaction analysis indicated only a slight difference between the satisfaction levels of *tangkahan* users and general fishing port users, with each satisfaction level at 75.6 and 75.2 %, respectively, indicating an overall satisfaction level of 75.5 %. Although the majority of *tangkahan* users were satisfied with the fishing port facilities and service quality, most of them preferred to use their existing infrastructure. The main reason for this was the substantial cost reductions in transportation and storage logistics being more important than any prospective advantages of moving to new facilities. Moreover, the level of service excellence offered at the port played a pivotal part in strengthening this decision. Nevertheless, this circumstance highlighted a fundamental problem of insufficient port infrastructure being unable to incentivize customers to shift to possibly more effective or modernized facilities. Therefore, port management is recommended to perform a thorough evaluation of the existing infrastructure and service operations. It might target the making of improvements in not only the overall functionality of the fishing ports, but also the making of new facilities to be more attractive and financially viable for all user groups.

4. Conclusions

The study of Belawan Samudera Fishing Port shows a different service quality regarding the areas of facility access and user interactions. This gap leads to worse than ideal experiences in the dimensions of direct evidence and empathy. Notwithstanding these difficulties, the port still retains a 75.5 % satisfaction level, which is largely attributed to its operational dependability. Therefore, the

study highlighted that good customer interaction and experience improves service quality, which enable enhancement of port management effectiveness and reputation.

It is critical for port management to address the specific areas of concern to further improve service quality and consumer satisfaction. For the case of Belawan Samudera Fishing Port, improving road access to the warehouse is an essential start point to maximize the effectiveness of logistics and enable more seamless fish distribution. Through such an effort, the management may facilitate the improvement of overall port user experiences. In addition, all stakeholders involved, including *tangkahan* owners and small-scale fishers, are required to strengthen security measures in the shipping route to achieve safe and comfortable port operation.

Finally, routine facility maintenance and assessments must be a top priority for port management. Neglecting this aspect may lead to the decreasing interest of users, especially *tangkahan*, who would choose their private-owned facilities over inadequate government-managed port facilities. Guaranteeing continuous growth and user satisfaction by putting such targeted changes into practice will be in line with both of its operational and strategic aims, which is the main task of port management.

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References

- Allen, D. R. (2004). *Customer satisfaction research management: A comprehensive guide to integrating customer loyalty and satisfaction metrics in the management of complex organizations* (pp. 1-264). American Society for Quality, ASQ Quality Press, Milwaukee.
- Anderson, E. W., & Fornell, C. (2000). Foundations of the American Customer Satisfaction Index. *Total Quality Management*, 11(7), 869-882. <https://doi.org/10.1080/09544120050135425>.
- Arsovska, J. (2012). *Researching difficult populations: interviewing techniques and methodological issues in face-to-face interviews in the study of organized crime* (pp. 397-415). Handbook of Survey Methodology for the Social Sciences. https://doi.org/10.1007/978-1-4614-3876-2_23
- Bae, H. (2016). Relationship between a Port's Reputation, customer satisfaction and customer loyalty. *Journal of International Logistics and Trade*, 14(3), 174-181. <https://doi.org/10.24006/jilt.2016.14.3.174>.
- Barabino, B., Deiana, E., & Tilocca, P. (2012). Measuring service quality in urban bus transport: A modified servqual approach. *International Journal of Quality and Service Sciences*, 4(3), 238-252. <https://doi.org/10.1108/17566691211269567>
- BPS. (2022). *Analisis Profil Penduduk Indonesia Mendeskripsikan Peran Penduduk dalam Pembangunan (Analysis of Indonesia's population profile describes the role of population in development)* (pp. 1-112). Badan Pusat Statistik.
- Cho, C. H., Kim, B. I., & Hyun, J. H. (2010). A comparative analysis of the ports of Incheon and Shanghai: The cognitive service quality of ports, customer satisfaction, and post-behaviour. *Total Quality Management*, 21(9), 919-930. <https://doi.org/10.1080/14783363.2010.487677>
- DeVellis, R. F., Thorpe, C. T. (2021). *Scale development: Theory and applications* (pp. 1-320). California: SAGE Publications.

- Dinwoodie, J., Tuck, S., Knowles, H., Benhin, J., & Sansm, M. (2011). Sustainable development of maritime operations in ports. *Business Strategy and the Environment*, 21(2), 111-126. <https://doi.org/10.1002/bse.718>
- Gideon, L. (2012). *The art of question phrasing* (pp. 91-107). Handbook of Survey Methodology for the Social Sciences. https://doi.org/10.1007/978-1-4614-3876-2_7
- Ha, M. S. (2003). A comparison of service quality at major container ports: implications for Korean ports. *Journal of Transport Geography*, 11(2), 131-137. [https://doi.org/10.1016/S0966-6923\(02\)00069-8](https://doi.org/10.1016/S0966-6923(02)00069-8)
- KKP. (2012). *Regulation of the minister of maritime and fisheries affairs of the Republic of Indonesia Number 8 of 2012 concerning Fishing Ports*. Republic of Indonesia.
- Lu, J., Gong, X., & Wang, L. (2011). An empirical study of container terminal's service attributes. *Journal of Service Science and Management*, 4(1), 97-109. <http://dx.doi.org/10.4236/jssm.2011.41013>
- Marczyk, G. R., DeMatteo, D., & Festinger, D. (2005). *Essentials of research design and methodology*. John Wiley & Sons.
- Mittal, V., & Kamakura, W. A. (2001). Satisfaction, repurchase intent, and repurchase behavior: Investigating the moderating effect of customer characteristics. *Journal of Marketing Research*, 38(1), 131-142. <https://doi.org/10.1509/jmkr.38.1.131.18832>
- Mollaoglu, M., Gurturk, M., Celik, E., & Gul, M. (2023). *Interval type-2 trapezoidal fuzzy AHP: Evaluation of sustainable port service quality factors* (pp. 27-45). In *Analytic Hierarchy Process with Fuzzy Sets Extensions: Applications and Discussions*. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-39438-6_2
- Neysi, A., & Dadkhah, A. (2013). Developing affective model for measuring and managing customer satisfaction in container ports. *Journal of Asian Business Strategy*, 3(9), 224-232.
- Nur, F., Suadi, & Suwarman. (2023). Enhancing fishing port services quality to support fish supply chains of the island fisheries at the Belitung island. *Jurnal Perikanan Universitas Gadjah Mada*, 25(1), 31. <https://doi.org/10.22146/jfs.82811>
- Nurhayatin, O. T., Mudzakir, A. K., & Wibowo, B. A. (2016). Analysis of fishermen's satisfaction level towards services of fishing needs provided in Nusantara Fishing Port (PPN) Prigi, Trenggalek Regency, East Java. *Journal of Fisheries Resources Utilization Management and Technology*, 5(1), 12-27.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988) Servqual: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64, 12-40.
- Putera, I., Suadi, & Budhiyanti, S. (2022). User's satisfaction levels toward Sadeng coastal fishing port service at Gunungkidul Regency. *Marine Fisheries Journal of Marine Fisheries Technology and Management*, 13(2), 149-160. <https://doi.org/10.29244/jmf.v13i2.41020>.
- Rangkuti, F. (2006). *Measuring customer satisfaction: Measuring techniques and strategies to increase customer satisfaction and analysis of PLN Case-JP*. Gramedia Pustaka Utama.
- Rust, R. T., & Zahorik, A. J. (1993). Customer satisfaction, customer retention, and market share. *Journal of Retailing*, 69(2), 193-215. [https://doi.org/10.1016/0022-4359\(93\)90003-2](https://doi.org/10.1016/0022-4359(93)90003-2).
- Sam, E. F., Hamidu, O., & Daniëls, S. (2018). Servqual analysis of public bus transport services in Kumasi metropolis, Ghana: Core user perspectives. *Case Studies on Transport Policy*, 6(1), 25-31. <https://doi.org/10.1016/j.cstp.2017.12.004>
- Speir, C., Caroline, P., & Jon, G. S. (2014). Port level fishing dynamics: Assessing changes in the distribution of fishing activity over time. *Marine Policy*, 46, 171-191. <https://doi.org/10.1016/j.marpol.2014.01.014>
- Thai, V. V. (2016). The impact of port service quality on customer satisfaction: The case of Singapore. *Maritime Economics & Logistics*, 18, 458-475. <https://doi.org/10.1057/mel.2015.19>

Ugboma, C., Callistus, I., & Innocent, C. O. (2004). Service quality measurements in ports of a developing economy: Nigerian ports survey. *Managing Service Quality*, 14(6), 487-495.
<https://doi.org/10.1108/09604520410569829>