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Assessment of Service Quality of Sinabang Ferry Port Based on Sinabang - Calang Route Users' Perception

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Abstract

Sinabang Ferry Port serves as a vital transportation hub connecting Simeulue Island with the mainland Sumatra, especially in serving remote and underdeveloped areas. As passenger traffic increases, evaluating service quality becomes crucial to support port management improvements and increase user satisfaction. This study aims to analyze the level of service at Sinabang Ferry Port based on user satisfaction and identify service attributes that need to be prioritized for quality improvement. The data were analyzed using the Importance Performance Analysis (IPA) method with five dimensions of service quality, namely tangibles, reliability, responsiveness, assurance, and empathy. The number of respondents was set at 156 people using the Slovin formula based on the average weekly number of passengers. The results showed that the level of user satisfaction with Sinabang Ferry Port services obtained an average level of suitability (LoS) score of 85,13%, indicating that user may dissatisfaction with port services and the need for improvements. The attributes that need to be prioritized (Quadrant I) include facilities for people with disabilities, pregnant women, and the elderly, information about terminal layout, departures and arrivals, and the availability of security equipment, such as CCTV. Furthermore, the tangibles, reliability, and assurance dimensions require significant attention to enhance service quality. These results provide essential insights for port authorities in formulating targeted and sustainable strategies to strengthen ferry service management and support regional accessibility.

Keywords: Ferry Port, Service Level, User Satisfaction, Importance Performance Analysis, Underdeveloped Areas

Introduction

Maritime transportation plays a vital role in Indonesia's national transportation system as the world's largest archipelagic country. Ports as maritime transportation hubs are strategic infrastructure that connect island regions, support logistics distribution, and facilitate passenger movement. This role is even more crucial in frontier, outermost, and disadvantaged island regions

such as Simeulue Island in Province of Aceh where maritime transportation is the backbone of the connectivity with the mainland Sumatra.

Sinabang Ferry Port is situated in Simeulue Regency with passenger traffic has continued to increase in recent years. Based on data from the Aceh Transportation Agency E-Manifesto 2025, the number of passengers at Sinabang Port in 2024 reached 46,938 people [1]. This increase mainly occurs during certain periods, such as holidays and long weekends when the port has to serve a drastic surge in number of passengers.

The operation of Ferry Ports to serve inter-district/city routes within a province is under the authority of regional governments [2], as mandated by Law Number 23 of 2014 concerning Regional Government [3]. In 2023, the government built an additional pier in an effort to improve safe, comfortable, efficient, and reliable services for transportation users [4]. This is in line with the Minister of Transportation Regulation No. PM 39 of 2015 concerning Passenger Service Standards for Ferry Transportation which regulates the minimum service standards that must be met by ferry ports [5].

In the context of public services, user satisfaction is an important indicator in assessing service performance. Evaluating the level of user satisfaction with port services needs to be done regularly to identify aspects that need improvement and enhancement [6].

Based on this background, this study was conducted to analyze the level of service at Sinabang Ferry Port based on user satisfaction. The results of this study are expected to provide input for port managers in improving service quality and meeting the needs of port service users.

Literature Review

The quality of services at ferry ports plays a crucial role in ensuring the smooth mobility of communities, particularly in island regions. Service quality evaluation is not only related to the technical standards of port operations but also to the level of user satisfaction. The Importance Performance Analysis (IPA) method has been widely applied in port-related studies in Indonesia to identify the gap between the importance level and actual service performance. Sabaruddin et al. [7], in their study at Bastiong Ferry Port, found that waiting room facilities and departure schedule information remain the main concerns of passengers. Similarly, Suryawan et al. [8] at Bau-Bau Port revealed that cleanliness and waiting area comfort were categorized as priority improvements. At Waai Port, Pattiasina et al. [9] emphasized that safety aspects and basic facilities did not meet passenger expectations. These findings are consistent with Daga et al. [10] at Seba Sabu Raijua Port, who combined IPA and the Customer Satisfaction Index (CSI) and found significant gaps in the dimensions of tangibles and responsiveness.

Furthermore, the study at Gresik Port by Mahardika et al. [11] identified that terminal accessibility and the availability of disability facilities still need improvement. Similar findings were reported by Nurhayati et al. [12] at Mintin

Port, where service performance was rated lower compared to its high level of importance, particularly regarding safety and cleanliness. In North Maluku, research at Speed Rum Harbor by Abdullah et al. [13] confirmed that departure schedule information and passenger traffic management remain major issues.

To provide a clearer comparison of previous findings, Table 1 summarizes key studies on ferry port service quality in Indonesia, highlighting the recurring issues and methodological approaches used.

Table 1. Comparison table of previous studies on ferry port service quality

Author / Year	Study Location	Method	Key Issues Identified	Priority Dimensions / Attributes
Sabaruddin et al. (2021) [7]	Bastiong Ferry Port	IPA	Waiting room discomfort, unclear schedule information	Tangibles, information service
Suryawan et al. (2020) [8]	Bau-Bau Port	IPA	Cleanliness, waiting area comfort	Tangibles, responsiveness
Pattiasina et al. (2019) [9]	Waai Port	IPA	Insufficient safety facilities, basic utilities lacking	Safety, basic facilities
Daga et al. (2022) [10]	Seba Sabu Raijua Port	IPA + CSI	Gaps between importance & performance in multiple areas	Tangibles, responsiveness
Mahardika et al. (2021) [11]	Gresik Port	IPA	Poor accessibility, inadequate disability facilities	Accessibility, special needs facilities
Nurhayati et al. (2020) [12]	Mintin Port	IPA	Safety issues, low cleanliness standards	Safety, cleanliness
Abdullah et al. (2023) [13]	Speed Rum Harbor (North Maluku)	IPA	Schedule information problems, traffic management issues	Information clarity, operational management

Overall, the literature reveals recurring service quality issues across ferry ports primarily related to comfort, safety, cleanliness, accessibility, and clarity of information. Although the IPA method is well-established in ferry port assessments, there is a notable scarcity of studies focusing on Sinabang Ferry Port despite its strategic role in supporting island connectivity in Aceh. This study addresses this gap by applying IPA to examine service quality at Sinabang Ferry Port, thereby providing empirical evidence that links national-level patterns in ferry port performance with local service conditions and offering context-specific insights for improving port management.

Methods

Research Subject and Data Collection Techniques

The subjects of this study are users of Sinabang port services, specifically those who use the Sinabang - Calang crossing route. This route was chosen because it has the highest number of passengers compared to several other routes. Data for this research was obtained directly in the field by distributing questionnaires and interviews respondents with users of the Sinabang Ferry Port, which was useful for analyzing user satisfaction levels. Data required in this research are respondent characteristics, respondent travel characteristics, importance scores, and performance indicator scores [14].

Based on 2025 data, the daily number of passengers on the Calang - Sinabang route is 250 people. The sample size determination was conducted using the Slovin formula, which is designed to obtain a representative sample from the

population [15]. Using the Slovin formula with a 95% confidence level (α = 0.05), the sample size was set at 156 respondents.

Data on the level of importance and performance of service attributes in IPA analysis are represented using a Likert scale. This scale that Developed by Rensis Likert in 1932 is designed to measure the attitudes, opinions, perceptions, and preferences of an individual or group of individuals toward a social phenomenon [16]. The Likert scale consists of a number of statements with answer choices that indicate the level of agreement or disagreement. In measuring service quality, this scale uses five levels, ranging from very poor to very good to measure performance, and from very unimportant to very important to measure the level of importance. [17]. The research variables were grouped into five dimensions of service quality (SERVQUAL) [18] with a total of 17 attributes [19]. The variables and service attributes assessed in this study are presented in Table 2.

Table 2. Service quality dimensions and attributes

Service Quality	Attributes
Tangibles	1. Facilities for air circulation and lighting systems 2. Public facilities, such as waiting rooms and toilets 3. Sufficient width of the gangway 4. Availability of parking areas for drop-offs/pick-up 5. Facilities for disabilities, pregnant women, and the elderly
Reliability	6. Online ferry service information 7. Ease of obtaining a ship 8. Public transportation services at the port
Responsiveness	9. Information about terminal layout, departures and arrivals 10. Port information services through audio, and visual 11. Officers respond quickly to complaints
Assurance	12. Emergency safety facilities 13. Mitigation of accidents caused by environmental factors 14. Availability of security equipment, such as CCTV 15. Information complaint services like contact person stickers
Empathy	16. Officers serve regardless of social status 17. Officers serve passengers respectfully and politely

Prior to the main survey, the questionnaire was validated through a pilot test involving 30 respondents. Construct validity was examined using the Product Moment correlation technique, where an item is considered valid if r_count > r_table. At a significance level of α = 5% and n = 30, the r_table value was 0.361. All questionnaire items met the requirement (r_count > 0.361), indicating that all items were valid. Reliability testing was conducted using Cronbach's alpha, where a coefficient above 0.60 indicates acceptable internal consistency. All variables produced Cronbach's alpha values above 0.60, confirming that the instrument is reliable.

Data Analysis Procedure

Importance Performance Analysis (IPA) method was selected due to its simplicity, clarity, and strong suitability for identifying service attributes that require prioritized improvement in public transportation facilities. IPA provides an intuitive framework that enables decision-makers to determine which service aspects should be maintained, improved, or reallocated based on user perceptions of importance and performance.

The Importance Performance Analysis (IPA) method was first introduced by Martilla and James as a simple framework for analyzing the attributes of a product [20]. This analysis is used to compare service users' assessments of service quality importance with service quality performance. The analysis stages include [21]:

1. Calculate the average performance and importance level for each attribute:

$$\bar{X} = \frac{\Sigma Xi}{n} \quad (1)$$

$$\bar{Y} = \frac{\Sigma Yi}{n} \quad (2)$$

2. Calculating Level of Suitability (LoS):

$$LoS = \left(\frac{Xi}{Yi}\right) \times 100\% \quad (3)$$

If the LoS value is ≥ 100%, then service performance is deemed to be in line with or even exceeding user expectations, and can therefore be categorized as very good. Conversely, if the LoS value is < 100%, then service performance is not in line with user expectations, which means that efforts to improve and enhance quality are still needed [22].

3. Determine the quadrant boundaries in the Cartesian diagram:

$$\bar{\bar{X}} = \frac{\Sigma \bar{X}}{K} \quad (4)$$

$$\bar{Y} = \frac{\Sigma \bar{Y}}{K} \quad (5)$$

Where LoS denotes the level of suitability; Xi is the performance assessment score (or service satisfaction score); Yi is the importance score (or service user expectation score); $\bar{X}$ represents the average performance score; $\bar{Y}$ represents the average importance score; n is the number of respondents; and K is the number of service attributes.

4. Mapping attributes into the four quadrants of the IPA:

This step is to describe each attribute in a Cartesian diagram, as shown in Figure 1. The diagram above is an Importance Performance Analysis (IPA) framework used to map service attributes based on two dimensions, namely importance on the Y-axis and performance on the X-axis. The results of this mapping are divided into four quadrants that have strategic significance in decision-making for service improvement.

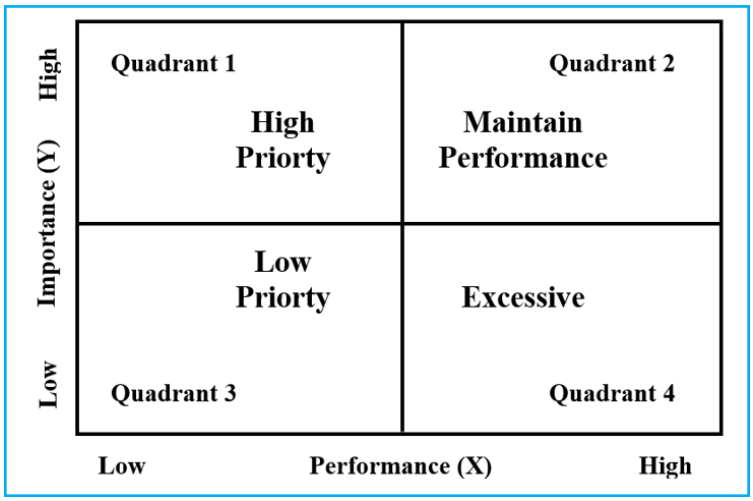

Figure 1. Cartesian importance diagram (Kitcharoen, 2004 [23])

Table 3. Respondent characteristics

Characteristics	Classification	Percentage
Gender	Male	60%
	Female	40%
Age	< 20 Years Old	30%
	21 - 30 Years Old	41%
	31 - 40 Years Old	13%
	41 - 50 Years Old	6%
	> 50 Years Old	10%
Occupation	Civil Servants/Military/Police	14%
	Entrepreneur	8%
	Private Employee	5%
	Farmers/Fishermen	8%
	Retiree	1%
	Student	51%
	others	13%
Purpose of Travel	Business/Work	20%
	Family Visit	26%
	Education	47%
	Medical Treatment	1%
	Other	7%
Frequency of Port Service Usage	Almost every day	3%
	Rarely	21%
	Sometimes	12%
	Very rarely	51%
	Often	13%

Quadrant I (High Priority) shows attributes with high importance but low performance, making them a top priority for improvement. Quadrant II (Maintain Performance) contains attributes with high importance and high performance; these attributes must be maintained consistently. Quadrant III (Low Priority) contains attributes with low importance and low performance, so they do not require special attention. Meanwhile, Quadrant IV (Excessive) describes

attributes with low importance but high performance; this condition indicates an excessive allocation of resources that can be diverted to aspects that are more in need.

Results and Discussion

Respondent Characteristics

Based on the survey results of 156 respondents, the characteristics of the respondents are explained in Table 3.

Satisfaction Analysis

Level of suitability (LoS). Based on the analysis results, the level of suitability (LoS) obtained for each service attribute assessed is shown in Table 4.

Table 4. Level of Suitability (LoS)

Attribute Number	Attributes	Xi	Yi	Level of suitability (LoS)
		1	2	3 = ½ x 100%
6	Online ferry service information	679	724	93,78%
7	Ease of obtaining a ship	664	749	88,65%
16	Officers serve regardless of social status	640	728	87,91%
17	Officers serve passengers respectfully and politely	667	759	87,88%
3	Sufficient width of the gangway	662	754	87,80%
10	Port information services through audio, and visual	660	756	87,30%
13	Mitigation of accidents caused by environmental factors	640	736	86,96%
12	Emergency safety facilities	636	737	86,30%
8	Public transportation services at the port	627	731	85,77%
2	Public facilities, such as waiting rooms and toilets	642	756	84,92%
4	Availability of parking areas for drop-offs/pick-up	635	748	84,89%
11	Officers respond quickly to complaints	634	748	84,76%
9	Information about terminal layout, departures and arrivals	632	749	84,38%
1	Facilities for air circulation and lighting systems	603	719	83,87%
15	Information complaint services like contact person stickers	597	738	80,89%
14	Availability of security equipment, such as CCTV	603	748	80,61%
5	Facilities for disabilities, pregnant women, and the elderly	530	751	70,27%
	Average			85,13%

Based on Table 4, it can be seen that all service attributes show a LoS value with an average of 85.13% which falls into the moderate satisfaction category (< 100%). This value indicates that the port's performance still does not meet the expectations of service users. Several attributes with low LoS values, such as facilities for people with disabilities, pregnant women, and the elderly (70.27%) and the availability of CCTV (80.61%), indicate the need for improvement in terms of accessibility and security.

The inadequacy of public facilities and security equipment suggests that routine maintenance, monitoring, and service evaluation activities may not be implemented consistently. This is commonly found in small to medium regional ports where resource constraints and fragmented coordination between port authorities, local government, and operators hinder timely upgrades. Additionally, the relatively low scores on attributes related to information services (e.g.,

complaint services, terminal layout information) point to gaps in human resource capacity and standard operating procedures for passenger communication.

When compared to other studies, the average LoS of Sinabang Port is relatively in line with other ferry ports in Indonesia. For example, a study at Mintin Port by Nurhayati et al [12] showed an average LoS of 83.20%, with cleanliness and security as the main weaknesses. Similarly, research at Bastiong Port by Sabaruddin et al [7] produced an average LoS of 84.75%, with the main problem being the clarity of departure schedule information. Meanwhile, research at Seba Sabu Raijua Port by Daga et al [10] recorded an average LoS of 82.60%, with tangibles and responsiveness being the main priorities for improvement.

On the other hand, ports with higher LoS, such as Bau-Bau Port (87.40%), show that services can still be improved, particularly in terms of the comfort of waiting rooms and environmental cleanliness [8]. These results show that Sinabang's LoS score (85.13%) is in the middle range higher than several other ports, but still lagging behind ports that already have better facilities.

Importance Performance Analysis (IPA). Based on the average values of $\bar{X}$ = 4,05 and $\bar{Y}$ = 4,76 as the quadrant limits. The results of the statistical analysis show the distribution of attributes as shown in Figure 2 and Table 5.

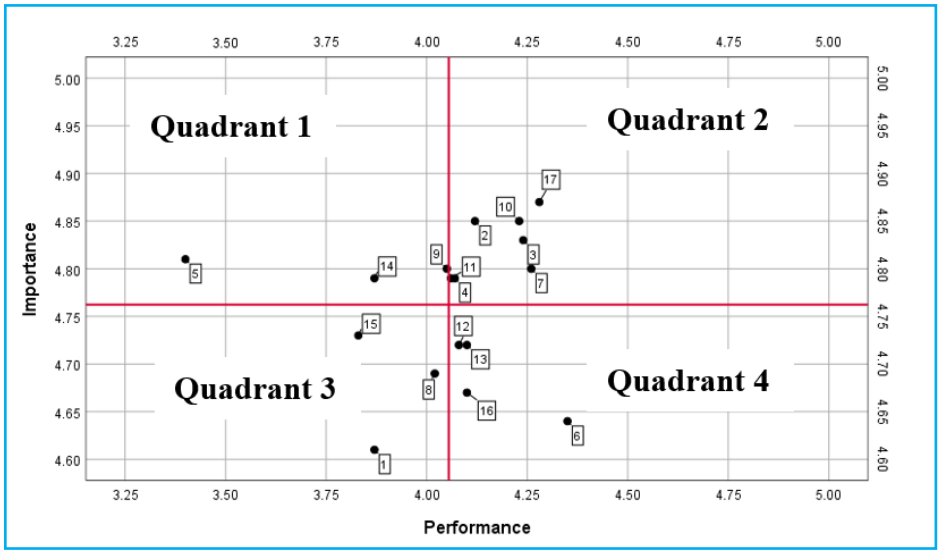

Figure 2. Performance analysis importance diagram

The findings of this study indicate that there are three main service attributes at Sinabang Ferry Port that require priority improvement, namely the availability of port information, security equipment such as CCTV, and facilities for vulnerable groups including persons with disabilities, pregnant women, and the elderly, respectively.

Port information including terminal layout, circulation, departure, and arrival schedules has become an urgent necessity as it directly affects user experience and travel efficiency. Unclear information may lead passengers to get lost, waste time, and ultimately reduce satisfaction levels. This condition is reinforced by the characteristics of Sinabang Port users, where 51% of respondents stated

Table 5. Service level classification

Quadrant I (High Priority)		Quadrant II (Maintain Performance)	
5.	Facilities for disabilities, pregnant women, and the elderly	2.	Public facilities, such as waiting rooms and toilets
9.	Information about terminal layout, departures and arrivals	3.	Sufficient width of the gangway
14.	Availability of security equipment, such as CCTV	4.	Availability of parking areas for drop-offs/pick-up
		7.	It's easy to get a ship
		10.	Port information services through audio, and visual
		11.	Officers respond quickly to complaints
		17.	Officers serve passengers respectfully and politely.
Quadrant III (Low Priority)		**Quadrant IV (Excessive)**	
1.	Facilities for air circulation and lighting systems	6.	Online ferry service information
8.	Public transportation services at the port	12.	Emergency safety facilities
15.	Information complaint services like contact person stickers	13.	Mitigation of accidents caused by environmental factors
		16.	Officers serve regardless of social status

that they rarely use ferry services, making them unfamiliar with the terminal layout. Furthermore, the majority of passengers (69%) hold a senior high school education level, which indicates the need for simple and easy-to-understand visual information. Operational complexity has also increased since the opening of a new jetty in 2023, creating additional challenges in passenger and vehicle circulation.

The availability of security equipment such as CCTV is a critical attribute since it is directly related to passenger safety and security. Functionally, CCTV serves as a deterrent to crime, enables rapid emergency response, and provides visual evidence for investigations. Geographically, Simeulue as a remote island area requires stricter security monitoring, especially considering the fluctuating volume of passengers, which increases significantly during holiday seasons. The expansion of port areas with the addition of a new jetty further demands comprehensive visual monitoring. From a regulatory perspective, the provision of CCTV aligns with PM 39/2015 on passenger service standards, as well as international requirements that emphasize the importance of modern security systems. Psychologically, CCTV enhances passengers' sense of security, strengthens trust in port operators, and encourages more orderly behavior.

Facilities for persons with disabilities, pregnant women, and the elderly deserve special attention as they reflect the principle of inclusiveness in public services. National regulations, explicitly require transportation service providers to ensure adequate accessibility. This is also in line with the Sustainable Development Goals (SDGs), which highlight the importance of inclusive development. From a social perspective, public expectations for equitable and socially responsible services continue to increase. Moreover, the benchmarking effect from other modes of transport that already provide disability-friendly facilities has amplified

the demand for similar improvements at ferry ports. Therefore, the provision of accessibility facilities is not only a regulatory obligation but also a form of social responsibility and a strategy to enhance the service image of the port.

Conclusions

Based on the findings of this study, it can be concluded that the overall user satisfaction level with the services provided by Sinabang Ferry Port shows an average level of suitability (LoS) value of 85.13%. This achievement indicates that the average performance of service attributes still does not fully meet the expectations of service users. In other words, there is a gap between user expectations and the quality of services received. Therefore, despite the relatively positive assessment, the results of the study also confirm that there are critical aspects that need to be addressed so that the quality of port services can be optimized and meet the diverse needs of users.

Specifically, the attributes that fall into Quadrant I, which represents areas of high importance but low performance, should be prioritized in future service enhancement strategies. These include the provision of adequate facilities for vulnerable groups, such as individuals with disabilities, pregnant women, and the elderly, as well as the availability of clear and accessible information related to terminal layout, departure schedules, and arrival times. Furthermore, the readiness and adequacy of security facilities particularly the installation and effective use of equipment such as Closed-Circuit Television (CCTV) also constitute key areas of concern that must be addressed to improve both user confidence and overall safety within the port environment.

In addition to these specific attributes, the study also emphasizes that the dimensions of tangibles, responsiveness, and assurance warrant particular attention. Improvements in these dimensions are essential not only to elevate the quality of physical facilities and infrastructure but also to strengthen the responsiveness of service personnel and ensure a higher degree of trust and reliability in service delivery. Taken together, these findings highlighted the importance of the more comprehensive and user-oriented approach to service management, which, if effectively implemented, can significantly enhance user satisfaction, operational efficiency, and the competitive advantage of Sinabang Ferry Port as a vital transportation hub.

This study has several limitations that should be acknowledged. The analysis focuses solely on users of the Sinabang–Calang route, which has the highest passenger volume but does not fully represent the perceptions of users from other routes served by Sinabang Ferry Port. Service quality assessments may differ across routes due to variations in operational conditions, passenger characteristics, sailing frequency, and vessel types. Therefore, the findings cannot be generalized to all service users at Sinabang Port.

Future work research should expand the scope by including multiple routes to obtain a more comprehensive understanding of service performance. Comparative analysis between routes may also reveal route-specific service gaps that require differentiated improvement strategies. In addition, future studies may

integrate qualitative approaches, such as in-depth interviews or observational assessments, to explore managerial, operational, and infrastructural constraints that cannot be captured through quantitative IPA techniques. Incorporating advanced analytical methods such as Structural Equation Modeling (SEM) or Multi-Criteria Decision-Making (MCDM) could also provide more robust insights into the causal relationships between service attributes and user satisfaction.

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Conflicts of Interest

All authors declare that they have no conflict of interests.

Author Contributions

Miranti Alpina: writing-original draft, writing- reviewing and editing, methodology, investigation. **Yusria Darma:** conceptualization, project administration, supervision, writing- reviewing and editing. **Cut Dwi Refika:** formal analysis, supervision. **Mubarak:** project administration, supervision. **Ahyin Bilhuda Dasopang:** formal analysis, visualization. **Faiza Mauladea:** project administration, investigation. **Suhana Koting:** conceptualization, methodology, supervision.

Data Availability Statement

The data used to support the findings of this study are included within the article.

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