

User Satisfaction of Intermodal Transportation Services at Nusantara Passenger Terminal, Tanjung Priok Port, Jakarta

¹Yusfita Chrisnawati*, ²Winoto Hadi, dan ³Tegar Abdi Putro

¹Civil Engineering Department, Faculty of Engineering, Universitas Tidar, Jl. Kapt. Suparman No. 39, Magelang, 56116

²Transportation Department, Faculty of Engineering, Universitas Negeri Jakarta, Jl. Rawamangun Muka No. 1, Jakarta Timur, 13220

³Directorate General of Land Transportation, Sub Directorate of Supporting Facilities and Intermoda

*Email correspondence: yusfita.chrisnawati@untidar.ac.id

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Abstract

The operator of the Nusantara Terminal in Tanjung Priok Port has provided an intermodal transport network through a variety of services. The presence of this intermodal transportation service must meet the quality of service that meets the satisfaction of its users. Quality of service reflects the perception of users of intermodal services. The need to maintain market share and increase profits is the main impetus for improving the quality of intermodal transportation services.

This study focuses on measuring user satisfaction and perceptions of intermodal transportation services and analyzing what factors need to be improved. The measurement of service user satisfaction uses the Customer Satisfaction Index (CSI) method. Meanwhile, the Importance Performance Analysis (IPA) method is used to analyze the factors that influence the satisfaction of service users. Data collection is done by direct observation, interview process, and questionnaires distribution to obtain data on perceptions and expectations of intermodal transportation services.

The calculation result of the CSI shows that respondents are satisfied with the facilities and services presented by the terminal manager; from the CSI value obtained, which is 71.79%. Calculation of IPA shows there are five attributes need to improved: (availability of pedestrian facilities with clear and safe path and protected against the weather; availability of bus shelter, taxi pick up point to accommodate passenger mobility; availability of complete and clear information related to route available, fare, and public transport operation hours; availability of adequate facilities for disabled; and availability of safe and convenience of intermodal connectivity facilities).

Keyword: Intermodal, CSI, IPA.

Introduction

One of the vital transportation infrastructures in the Indonesian Archipelago is the port. Ports that serve the movement of passengers and goods become the primary support for connectivity between regions. Tanjung Priok is the largest port in Indonesia, which is one of the priority ports in the development of a national strategic port. Besides having a high load of goods, Tanjung Priok also serves passenger ships between domestic areas through the Tanjung Priok Nusantara Terminal. BPS records the number of domestic and foreign cruise ship passengers arriving and departing through the Port of Tanjung Priok, are 233,760 passengers in 2017 (Badan Pusat Statistik, 2017). The focus of developing port infrastructure needs is the availability of multimodal transportation to reach ports such as access roads, port trains, coastal trains, and

multimodal systems according to the Sea Transportation Strategic Plan (Bappenas, 2019).

Based on ('UU Nomor 17 Tahun 2008 tentang Pelayaran', 2008) article 1 paragraph 15, The National Port Management System is a port system that contains the roles, functions, types, port hierarchy, the National Port Master Plan, and port location and intra-and intermodal integration as well as integration with other sectors. Particularly, Law No. 17/2008 on Shipping states that a fixed and regular route network for domestic sea transportation is prepared by considering intermodal transport integration where the definition of intermodal is integrated land, sea, and air transportation. The purpose of intermodal transportation is to create sustainable

passenger services such as one-stop service, equality of service level, and a single seamless service. In supporting the integration of intermodal transportation, it is necessary to have a service network and adequate transportation infrastructure network. A combination of service networks includes the integration of schedules routes, and routes while infrastructure network integration includes physical cohesiveness, that is, integration of modal transfer infrastructure for several modes located in a node location.

The provision of integrated transportation within the Tanjung Priok Nusantara Terminal environment is crucial where the arrangement of the types of modes of integrated transportation must be arranged to facilitate the mobility of passenger movement to and from the terminal. In 2018 PT Pelabuhan Indonesia II (Persero) Tanjung Priok Branch, PT Pelayaran Nasional Indonesia (PELNI), PT Transportation Jakarta (Transjakarta), and the Tanjung Priok Port Authority (OP) to collaborate to provide intermodal transportation networks by presenting Transjakarta bus services route 10C which has a loop route from the Tanjung Priok stop - Enggano stops - Tanjung Priok Harbor stop. The presence of this intermodal transportation service must meet the quality of service that meets the satisfaction of its users.

Quality of service reflects the perception of users of intermodal services, which depends on intermodal service operational decisions made by the manager, such as the type of service provided and how often the service is presented (Ryus and Al., 2010). The need to maintain market share and increase profits is a significant impetus for improving the quality of intermodal transport services (Pullen, 2007). In recent years the attention of public transport companies has begun to shift from the supply side, which focuses on providing services to the demand side where one of the goals is to improve service quality (Barabino and Francesco, 2016). The concept of evaluating service quality has received more attention in recent years and encourage transportation planners to be able to design new public transportation services or develop old public transportation services towards efficiency and focus on improving service and customer

satisfaction (Das and Pandit, 2013). In the literature on service and marketing of service and product, researchers prefer to define service quality from the perspective of individual users (Fitzsimmons, 2001). Quality of service is one way to manage business processes to ensure user satisfaction at various levels (Grzinic, 2007). Service quality is defined as the difference between user expectations of service performance and user perceptions of perceived service performance (Mercangoz, Paksoy and Karaguelee A.O., 2012).

Many factors affect users of transportation services when choosing the mode of transportation. One of the influential factors is the accessibility of public transit (Hadi, Chrisnawati and Ikhsan, 2018) where the more comfortable moves from one way to another, the user will experience a smooth travel experience and will likely repeat it. User perceptions of intermodal service quality can vary depending on the level of satisfaction and importance (Taylor *et al.*, 2014). Identifying inefficiencies in the public transportation service system will help improve service management, expand reach, and increase user interest in public transportation services. This study focuses on measuring user satisfaction and perceptions of intermodal transportation services provided by the Tanjung Priok Nusantara Terminal manager and analyzing what factors of multimodal transportation services need to be improved to meet user satisfaction.

Methodology

This research uses descriptive and quantitative analysis methods using primary and secondary data. Primary data is obtained from the questionnaire results of respondents using intermodal transportation facilities and services in the Tanjung Priok Port Nusantara Terminal, as well as direct observation data at the field conditions. The questionnaire was made on a Likert scale divided into 4 (four) rating scales. Respondents were taken by purposive sampling method on 70 users of modal integration facilities and behaviours, as explained in Table 1 and Table 2.

Table 1. SERVQUAL dimensions and the definitions

Dimensions	Definition	Items questionnaire
Reliability	The ability to perform the promised service dependably and accurately	3
Assurance	The knowledge and courtesy of employees and their ability to convey trust and confidence	3
Tangibility	The appearance of physical facilities, equipment, personnel, and communication materials	4
Empathy	The provision of caring, individualized attention to customers	2
Responsiveness	The willingness to help customers and to provide service	3

Table 2. Detail attribute of SERVQUAL dimensions

Dimension	No. Attribute	Attribute
Physical appearance (Tangible)	1	Availability of accessibility road to Tanjung Priok Port Nusantara Terminal with good condition
	2	Availability of pedestrian facilities with clear and safe path and protected against the weather
	3	Availability of public transport access to Tanjung Priok Port Nusantara Terminal
	4	Availability of complementary facilities such as ATM, canteen, praying room, lactation room, etc for passenger convenience
Reliability	5	Availability of bus shelter, taxi pick up point, etc., to accommodate passenger mobility in Tanjung Priok Port Nusantara Terminal
	6	Availability of complete and clear information related to route available, fare, and public transport operation hours
	7	Availability of adequate facilities for disabled
Responsiveness	8	Availability of complete and clear information related to how to get public transport service
	9	Availability of bus shelter, taxi pick up point, etc., with easy access and adequate facilities
	10	Availability of safe and clean waiting room for passenger convenience
Assurance	11	Availability of safe and convenience of intermodal connectivity facilities
	12	Availability of adequate parking lot capacity
	13	Availability of public transport service based on port operational hours
Empathy	14	Availability of customer-oriented officer
	15	Easiness of users/passenger to communicate/contact with port officer

The measurement of service user satisfaction attitude towards transportation mode integrated facilities at Tanjung Priok Port Nusantara Passenger Terminal uses the Customer Satisfaction Index (CSI) method. Meanwhile, the Importance Performance Analysis (IPA) method is used to determine the performance factors of the integrated transportation mode, which must be considered by the manager of the Tanjung Passenger Archipelago Passenger Terminal in meeting the user's satisfaction.

Customer Satisfaction Index (CSI)

Customer Satisfaction Index (CSI) is an index to determine the level of overall customer

satisfaction with an approach that considers the importance of the attributes of the product or service being measured. Based on (Narasimhan, 2008) the measurement stages are as follows:

1. Define *Mean Importance Score* (MIS) and *Mean Satisfaction Score* (MSS)

Mean Importance Score (MIS), this value is derived from the average level of importance and performance of each respondent.

$$MIS = \frac{\sum_{i=1}^n Y_i}{n} \quad (1)$$

$$\text{and } MSS = \frac{\sum_{i=1}^n X_i}{n} \quad (2)$$

2. Create Weight Factors (WF)

This weight represents the percentage of MIS values per attribute to the total MIS of all attributes.

$$WF = \frac{MIS_i}{\sum_{i=1}^p MIS_i} \times 100\% \quad (3)$$

3. Define Customer Satisfaction Index (CSI)

$$CSI = \frac{\sum_{i=1}^p WSI}{HS} \times 100\% \quad (4)$$

Overall level of satisfaction of respondents can be seen from the criteria of the level of satisfaction of respondents. The highest satisfaction is achieved if CSI shows 100%, with a satisfaction range of 0-100%. To create a numerical linear scale, the first step is by looking for a range of scales using the following formula:

$$RS = \frac{(m-n)}{b} \quad (5)$$

where:

RS : scale range
m : highest score
n : lowest score
b : classes taken

The calculation details are as follows:

$$RS = \frac{(100\% - 0\%)}{4} = 25\% \quad (6)$$

The CSI value in this study was divided into four criteria from very dissatisfied to very satisfied as in Error! Reference source not found..

Important and Performance Analysis

Important and Performance Analysis (IPA) is an integral part of the research that analyses the point of view of service users or products on the main attributes of the product or service itself (Martilla and James, 1977).

This IPA method is intended as a tool in analysis or a tool used to compare the extent of performance or service that can be felt by service users to their level of satisfaction. The results of the IPA will be presented in a Cartesian diagram where the X-axis shows the assessment of service users on company performance, and the Y-axis shows the assessment of the interests of service users. The intended level of importance is how important the product attributes are for service users or how much the user's expectations of the performance of these attributes, as depicted in Figure 1.

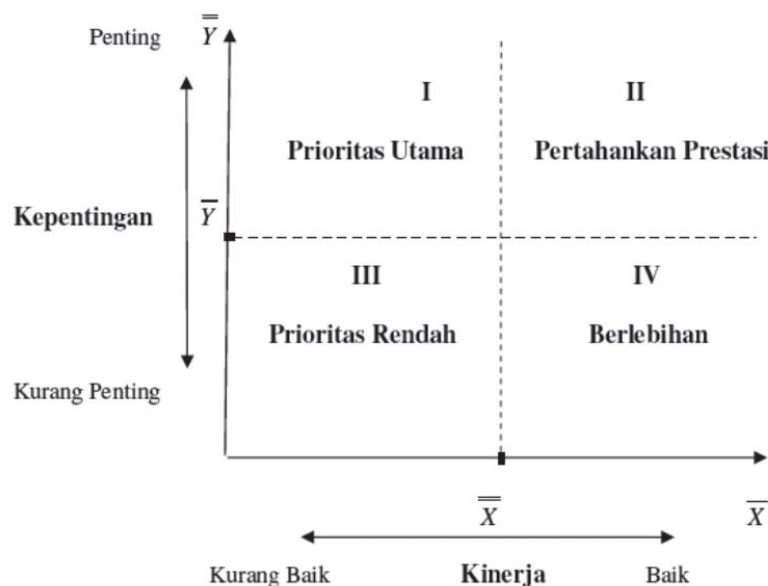


Figure 1. Diagram *Important and Performance Analysis*.

Source: (Rahmasari, Nuralina and Priatna, 2017)

Table 3. Scale range of CSI value

Number Index	Interpreters
75 % < satisfaction indeks ≤ 100 %	Very satisfied
50 % < satisfaction indeks ≤ 75 %	Satisfied
25 % < satisfaction indeks ≤ 50 %	Dissatisfied

0 % < satisfaction indeks ≤ 25 % Very dissatisfied

Table 4. Comparison of freight rates

Type of Transportation	Route	Fare
Conventional taxibike	Nusantara Passenger Terminal - Priok Bus Terminal	Rp. 15.000 - 20.000
Rent Angkot	Priok Bus Terminal - Nusantara Passenger Terminal	Rp. 50.000 - 75.000
Taxi	Nusantara Passenger Terminal - Priok Bus Terminal	Tentative
Transjakarta	Nusantara Passenger Terminal - Priok Bus Terminal	Rp. 3.500

Source: survey of respondents

Stages of calculating *Important and Performance Analysis* (IPA) in a brief as follow:

1. Calculating Total Value of Performance and Interest

The total value of performance and importance is obtained by adding up the value of each attribute from the total number of respondents.

2. Calculating the suitability level

Service priority order is measured by the level of suitability to determine the priority of the best service improvement to achieve service user satisfaction, by dividing the value of performance and importance per each attribute. The calculation details are as follows:

$$Tki = \frac{x_i}{y_i} \times 100\% \quad (7)$$

Results and Discussion

Existing port conditions

The Tanjung Priok Port Nusantara Passenger Terminal is in Tanjung Priok Port environment, which is the busiest port in Indonesia. Field survey shows that there are transportation nodes in the form of Tanjung Priok Bus Terminal and Tanjung Priok Train Station, which are not far from the port, ± 1.6 km. As a manifestation of the provision of integrated and integrated transportation, the manager of the

Tanjung Priok Port Nusantara Passenger Terminal provides advanced transportation in the form of paratransit public transportation, and Transjakarta feeder buses at the fare ratio as shown in **Table 4**.

Before the existence of the Transjakarta feeder bus service, most of the passengers continued their journey by Non-Motorized Transport (NMT) in the form of walking to the Tanjung Priok Bus Terminal, but the movement of people with NMT was not supported by good pedestrian facilities. Based on observations made, pedestrian must pass 2 (two) intersections that are not equipped with crossing or zebra-cross signal lights, with pedestrian paths unseparated with the road body. Considering that the port area is an area with large vehicle traffic, these conditions greatly threaten the safety of the movement of people with NMT. Comparison of vehicle travel time duration with NMT can be seen in **Table 5**.

Physical integration and means of transportation

The survey results show that the availability of transportation facilities and infrastructure is quite good. Service users are facilitated to carry out mobility from ships to road transport with less than 100 meters from the port terminal or with a duration of walking of less than 5 minutes.

Details of a review of the integration of transportation facilities and infrastructure at the Tanjung Priok Port Nusantara Terminal can be seen in **Figure 2, 3, and 4**.



Figure 2. Tanjung Priok Port access conditions.

Table 5. Comparison of vehicle travel duration with NMT

Type of Transportation	Route	Trip Duration
Conventional taxibike	Nusantara Passenger Terminal - Priok Bus Terminal	08 - 12 minutes
Rent car	Priok Bus Terminal - Nusantara Passenger Terminal	10 - 20 minutes
Taxi	Nusantara Passenger Terminal - Priok Bus Terminal	10 - 20 minutes
Transjakarta	Nusantara Passenger Terminal - Priok Bus Terminal	10 - 15 minutes
NMT	Nusantara Passenger Terminal - Priok Bus Terminal	15 - 23 minutes

Source: survey of respondents



Figure 3. Physical integration and transportation facilities at the Tanjung Priok Harbor Nusantara Terminal.

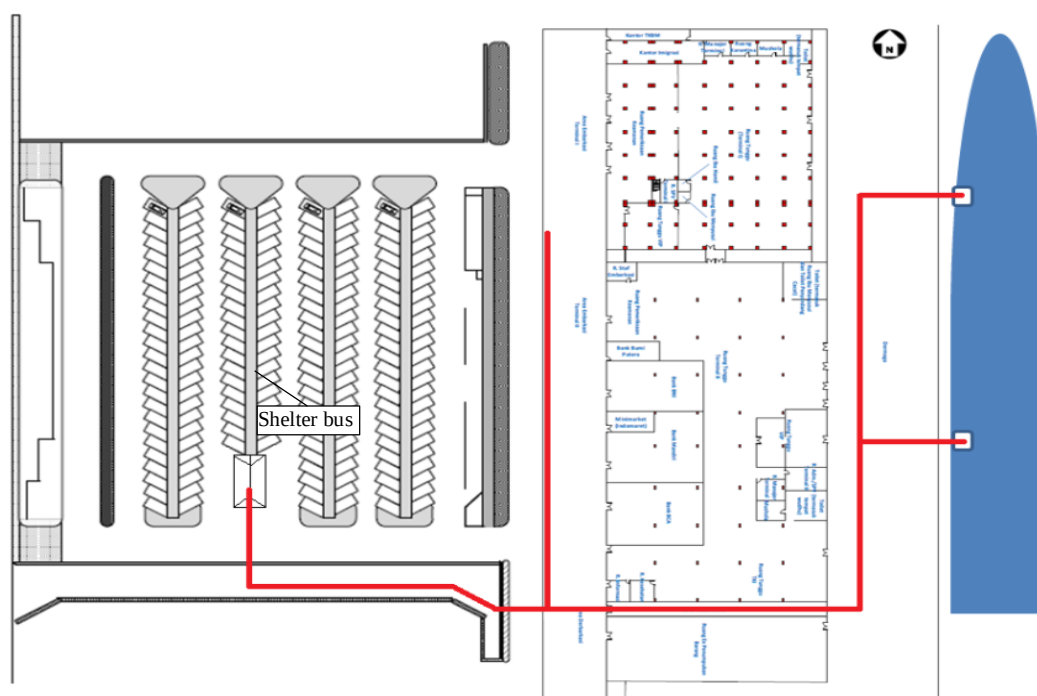


Figure 4. Layout of integrated transportation facilities and infrastructure in the Tanjung Priok Harbor Nusantara Terminal.

Source: PT Pelabuhan Indonesia II Cabang Tanjung Priok

Table 6. The integration of transportation facilities in Tanjung Nusantara Port Terminal

Indicator	Parameter	Review Results
Mode Availability	Number of transportation modes	4 Modes: • Conventional taxibike • Rent car • Taxi • Bus Feeder
Route Integration	Number of public transport routes passing through the port	1 Route: • Tanjung Priok - Pelabuhan Tanjung Priok (PP)
Fleet Availability	Number of fixed route public transport fleets passing through the port	2-3 bus (follow ship arrival & departure)
Availability of Transfer Modes	Easy to reach and provides a sense of security and comfort	Facilities: • Easy connecting road to the nearest shelter • Waiting room facilities are available

Analysis of the level of cohesiveness in terms of transportation facilities and infrastructure can be seen in **Tabel 6.** which consists of the number of transportation facilities that operate serving service users at the Tanjung Priok Port, Nusantara Terminal, as well as supporting facilities for transfer of passenger mode.

The integration of transportation services

Observations indicate that the integration of existing transportation services is not good enough.

Several modes of road transport that operate in the Port of Tanjung Priok currently do not have

integration in terms of the ticket fare purchase system. In addition, continued transportation information is still difficult to obtain, as is the frequency of unscheduled services between road and sea transportation. Details of a review of the integration of transportation services in the Tanjung Priok Port Nusantara Terminal can be seen in **Table 7.**

The separation of the two modes of service is caused by the management of different operators. To integrate the ticket and fare system between road and sea transportation modes, a

coordinator or legal entity operator who operates the integration of this sea and road transport ticket is required. Information should be provided by attaching a route map for advanced transportation on the information board or corner of the room, as well as for the frequency of Transjakarta feeder buses that currently have gaps because they have to adjust to the arrival and departure of ships, so service users often find it difficult to rely on them. If the arrival time of the ship is at 14.00 and for the departure of the feeder bus is 15 minutes thereafter, then when the bus departs the feeder bus service is terminated, so service users must switch to use the rental mode of transportation or taxi-bike which is more expensive or makes a movement of people with NMT.

The characteristics of respondents

From the questionnaire of 70 respondents, it is discovered that the number of male respondents is 41 people, while female respondent is 29 people as can be seen in **Figure 5**. The number of respondent 20 years-old below is 11 people, 21 - 30 years-old is 50 people, 31-50 years-old is 7 people, while over 50 years-old is 1 person as can be seen in **Figure 6**. Meanwhile, the number of respondents who use the type of mode of

transportation in the form of public vehicles is 32 people, while private vehicles is 38 people.

From the interview of respondents, it is discovered that some of them used paratransit or taxi-bike heading to port after using public transportation, and vice versa. While, some others used private vehicle as can be seen in **Figure 7**.

Respondent data also shows that in the last 3 years, the number of respondents traveling through the Nusantara Passenger Terminal of Tanjung Priok Port was dominated by respondents who had only traveled once as can be seen in **Figure 8**.

Customer Satisfaction Index (CSI)

The measurement of user satisfaction of the Tanjung Priok Port Nusantara Passenger Terminal service using the Customer Satisfaction Index (CSI) calculation method. CSI is used to determine the attitude of service user satisfaction by looking at the level of reality of each service quality statement variable. Based on the calculation of the Customer Satisfaction Index value in the data processing above, the value of performance or services provided by the manager of the Tanjung Priok Port Nusantara Passenger Terminal is 71.79%, thus this value is included in the satisfaction criteria.

Table 7. The Integration of Transportation Services

Indicator	Parameter	Review Result
Ticket Service	Ticket and sea and road transport rates	Separate
Operational time	Operational time of land transport and sea transport	Follow the schedule of sea transport
Frequency of service	Frequency of land transport and sea transport	There no fixed frequency
Further transport information	Road transport service information	No physical or visual information found

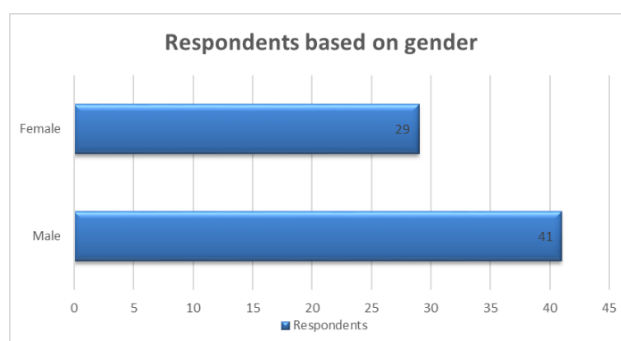


Figure 5. The respondents characteristics based on gender.

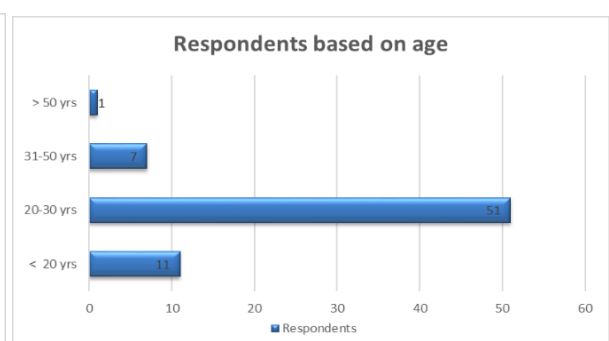


Figure 6. The respondents characteristics based on age.

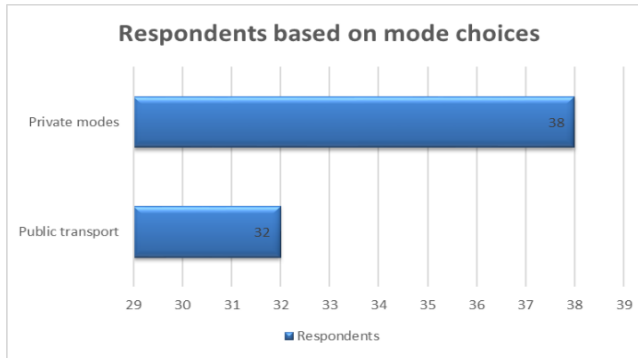


Figure 7. The respondents characteristics based on mode choices

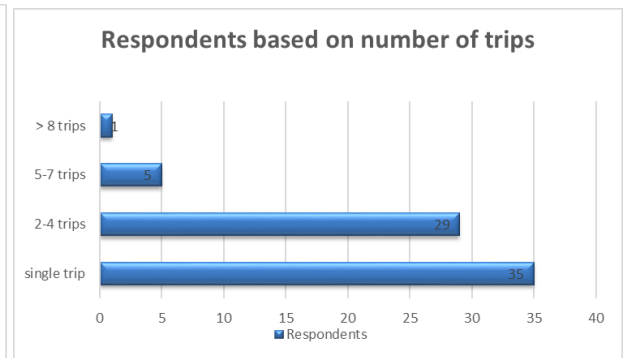


Figure 8. The respondents characteristics based on number of trips

Table 8. The recapitulation of “ Hold” and “ Action” Decisions

Dimension	No. Atributte	Conformity Level (%)	Decision score	Hold and Action
Physical appearance (Tangible)	1	84.82	79.86	H
	2	64.06	79.86	A
	3	74.00	79.86	A
	4	86.82	79.86	H
Reliability	5	74.51	79.86	A
	6	74.80	79.86	A
	7	76.86	79.86	A
Responsiveness	8	72.58	79.86	A
	9	77.69	79.86	A
	10	89.84	79.86	H
Assurance	11	75.29	79.86	A
	12	96.19	79.86	H
	13	75.40	79.86	A
Emphaty	14	86.35	79.86	H
	15	88.71	79.86	H

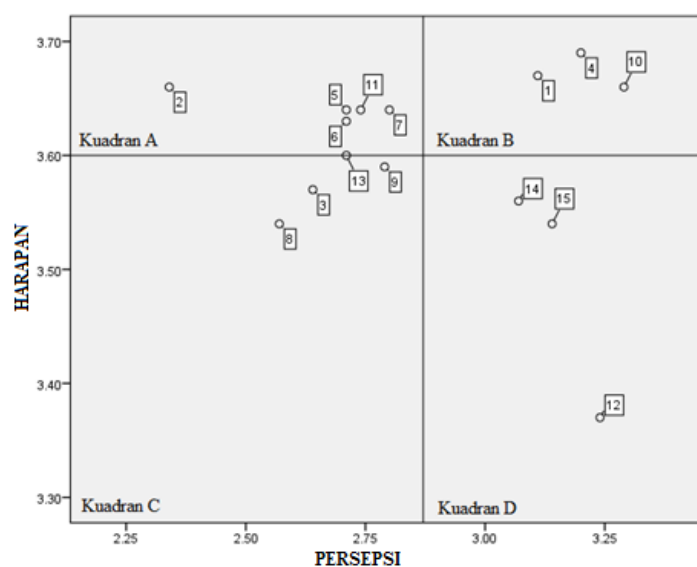


Figure 9. Cartesian diagram value of Importance Performance Analysis (IPA).

Importance Performance Analysis (IPA)

IPA model illustrates the priority of improvement based on the level of expectations and perceptions of the quality of services provided. In the Importance Performance Analysis (IPA) method, there is also a calculation to determine the order of service priorities, which is measured by the level of suitability to determine the priority of the best service improvement to achieve service user satisfaction. The result of data processing produces two decisions, namely "Hold" and "Action". Hold shows that the attribute must be maintained. While "action" indicates that the attribute requires improvement. Data tabulation can be seen in Table 8.

From the result of data processing carried out, the Cartesian diagram in Figure 9 shows several attributes that need to be improved and attributes that need to be maintained by the manager which is divided into quadrants (A, B, C and D) with detailed explanation as in Table 9.

Recommendations for enhancing mode integration

Recommendations related to problems in means of infrastructure and infrastructure integration can be seen in Table 10.

Table 9. Detailed Cartesian diagram value of Importance Performance Analysis (IPA)

No. Atributte	Position Quadrant	Information
1	B	Based on the respondents' assessment, this attribute gets a good rating, so the service provider or manager must maintain the services provided
2	A	Based on respondents' assessment, this attribute gets an assessment that is still not in accordance with what is expected by the service user, so the service provider needs to work on improvement
3	C	Based on the respondent's assessment, this attribute is considered not important and gets an assessment that is not yet as expected by the service user, hereby the manager must consider the possibility that will occur
4	B	Based on the respondents' assessment, this attribute gets a good rating, so the service provider or manager must maintain the services provided
5	A	Based on respondents' assessment, this attribute gets an assessment that is still not in accordance with what is expected by the service user, so the service provider needs to work on improvement
6	A	Based on respondents' assessment, this attribute gets an assessment that is still not in accordance with what is expected by the service user, so the service provider needs to work on improvement
7	A	Based on respondents' assessment, this attribute gets an assessment that is still not in accordance with what is expected by the service user, so the service provider needs to work on improvement
8	C	Based on the respondent's assessment, this attribute is considered not important and gets an assessment that is not yet as expected by the service user, hereby the manager must consider the possibility that will occur
9	C	Based on the respondent's assessment, this attribute is considered not important and gets an assessment that is not yet as expected by the service user, hereby the manager must consider the possibility that will occur
10	B	Based on the respondents' assessment, this attribute gets a good rating, so the service provider or manager must maintain the services provided
11	A	Based on respondents' assessment, this attribute gets an assessment that is still not in accordance with what is expected by the service user, so the service provider needs to work on improvement
12	D	Based on the respondent's assessment, this attribute is considered not important but gets an assessment that is in accordance with what is expected by the service user
13	C	Based on the respondent's assessment, this attribute is considered not important and gets an assessment that is not yet as expected by the service user, hereby the manager must consider the possibility that will occur
14	D	Based on the respondent's assessment, this attribute is considered not important but gets an assessment that is in accordance with what is expected by the service user
15	D	Based on the respondent's assessment, this attribute is considered not important but gets an assessment that is in accordance with what is expected by the service user

Table10. The analysis of recommendations for enhancing mode cohesiveness

Review	Problems	Recommendations
Terminal access facilities	There is no fixed frequency with the feeder bus service	Aligning the frequency of road transport services by sea ships such as upon arrival and departure
Terminal access facilities	Fares or tickets that have not been integrated between road transport and ships	Providing integration of road and ship transportation tickets, with cooperation between operators
Terminal access infrastructure	The lack of crossing signal signs for pedestrians	Arranging safety crossing lane
	Pedestrian paths that join the body of the road	Arranging pedestrian facilities along access to the Passenger Terminal

Conclusion

Based on the results of data processing and analysis carried out in the previous chapter, several conclusions can be drawn for efforts to improve facilities, service quality, and information.

The results of the calculation of the Customer Service Satisfaction Index of service users in the Transportation Mode Integration Facility at the Tanjung Priok Port Nusantara Passenger Terminal are 71.79%, thus this value is included in the satisfaction criteria. From the results of these calculations, it is better for the manager of the Tanjung Priok Port Nusantara Passenger Terminal to continue to improve the quality of services so that service users can feel very satisfied with the facilities and services provided at the Tanjung Priok Port Nusantara Passenger Terminal.

There are 5 (five) attributes which need to be improved, namely, attribute 2 (The availability of pedestrian facilities with clear and safe path and protected against the weather); attribute 5 (the availability of bus shelter, taxi pick up point, etc., to accommodate passenger mobility in Tanjung Priok Port Nusantara Terminal); attribute 6 (The availability of complete and clear information related to route available, fare, and public transport operation hours); attribute 7 (The availability of adequate facilities for person with disabilities); and attribute 11 (the availability of safe and convenience of intermodal connectivity facilities).

The results of the intermodal connectivity evaluation show that there are some issues in integration multimodal facilities. The operator of Tanjung Priok Port Nusantara Passenger Terminal needs to put more effort on creating integration of ticket fare purchase system. Besides, they also need to synchronize passenger ship schedule with the availability of in-land public transport services. In pedestrian infrastructure, the operators are suggested to provide better pedestrian facilities

and put more attention to safety and convenience aspects.

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