

# Analysis of Service Performance for Intermodal Facilities in The Area of Asrama Haji and Bumi Sriwijaya Stations

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## ABSTRACT

The integrated intermodal service system between the South Sumatra Light Rail Transit (LRT) and road-based transportation modes such as the Palembang Bus Rapid Transit (BRT) and Angkot Feeder Musi Emas still has shortcomings, particularly in the areas of the Asrama Haji and Bumi Sriwijaya Station. This research is conducted to observe the conditions of the physical facilities, payment integration, and schedules at both stations, as well as to examine the regulations in meeting the standards of ideal pedestrian physical facilities, which are then compared with passenger perceptions. This research utilizes the methods of crosstabulation analysis and Importance Performance Analysis (IPA). Crosstabulation analysis is used to determine the relationship between respondents' sociodemographic and their travel characteristics. Importance Performance Analysis (IPA) is used to assess passenger perceptions of the performance quality of intermodal facilities. Based on the research finding, according to passengers perceptions of 49 service attributes, there are 20 attributes that have a high level of importance but low performance, indicating the existence of three service provision needs that need to be prioritized for improvement. First, the provision of adequate and disability-friendly sidewalk facilities. Second, the provision of pedestrian crossing facilities. Third, the access to and from the node that is free from traffic conflicts. The recommended solutions include the construction of sidewalks connected to the node points, built higher than the road surface, installation of guiding block, barrier posts, and ramps at each end of the sidewalk, construction of an overpass (JPO) at the Asrama Haji Station and a pelican cross at the Bumi Sriwijaya Station, and the regulation of transit areas to prevent vehicles from parking and waiting at the entrance and exit points of the node.



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## 1. Introduction

The high social mobility of the community in Palembang City has resulted in an increasing demand for transportation. Along with the city's development and the increasing social activities of the community, there has been a corresponding increase in social mobility, which in turn has led to an increase in the volume of vehicles and subsequently traffic congestion on several roads in Palembang City [1].

Based on data collected from the Central Statistics Agency (BPS) in 2022, it is known that the area of Palembang City is 352.51 km<sup>2</sup>, which accounts for 0.41% of the total area of South Sumatra Province. The city has a population of 1,707,996 people, which constitutes 19.72% of the total population of South Sumatra Province [2]. As for private vehicle ownership, there are 382,685 motorcycles and 145,035 cars registered in the city [3].

One of the government's efforts to address the traffic congestion issue is by reducing the use of private vehicles and improving public transportation services in Palembang City. One initiative is Public Transport movement (Gerakan Nasional Kembali ke Angkutan Umum (GNKAU)), where Palembang serves as the first pilot city for promoting public transportation usage in Indonesia. Palembang has a relatively comprehensive public transportation system, including the South Sumatra Light Rail Transit (LRT), the Teman Bus Rapid Transit (BRT), and the Musi Emas Feeder.

The Sumsel Light Rail Transit (LRT) is expected to serve as the backbone of mass transportation in Palembang City, improving the quality of urban planning, transportation, economy, and other aspects within the urban area. To increase public interest in using the Light Rail Transit (LRT), it is necessary to enhance feeder transportation and ensure effective and efficient intermodal transfers [4].

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Feeder transportation refers to public transportation services designed for areas with lower population density, utilizing vehicles with smaller capacities [5]. The provision of feeder transportation is an integral part of a comprehensive program that supports urban transportation services [6].

Mass transportation modes should be accessible to all members of society, enabling them to engage in social activities quickly, easily, and safely. The mass transportation service system should constantly be improved, including the enhancement of physical integration, payment integration, and schedule integration across all modes of transportation [7]. The concept of urban public transportation integration consists of three main components: physical integration, which enables passengers to transfer efficiently within and/or between modes; payment integration, which provides a unified payment access for multimodal travel; and schedule integration, which provides synchronized arrival and departure schedule information for different modes of transportation [8]. Network integration is a key factor in the success of a public transportation system in a region or city [9]. Intermodal transportation integration not only facilitates passengers in accessing a wide range of transportation networks but also ensures safe, comfortable, and efficient transfers between different modes of transportation [10].

In the rapid and continuous growth of cities, it is believed that urban sprawl phenomena will occur, partly due to the limitations of urban land availability [11]. High economic costs can result from poor urban planning and transportation, which necessitates the implementation of Transit-Oriented Development (TOD) as a concept for integrated spatial and transportation management. TOD emphasizes the development of transit systems and infrastructure in close proximity to residential, commercial, and recreational areas, promoting walkability, reducing dependency on private vehicles, and enhancing overall urban sustainability [12].

The principle of TOD is to create an area where the mobility of residents relies on non-motorized modes of transportation, such as walking [13]. TOD is a type of development that takes place within a 10-minute walk, approximately 400 meters, from a railway station. This type of development includes the creation of transit corridor areas for Bus Rapid Transit (BRT) as well as railway stations serving light rail, heavy rail, and commuter lines [14].

Based on the concept of modal integration, an assessment needs to be conducted to determine whether the Asrama

Haji Station and Bumi Sriwijaya Station are well integrated with other modes of transportation, such as BRT (Bus Rapid Transit) and Musi Emas Feeder, based on intermodal integration assessment parameters.

## 2. Method

The research that will be conducted will use quantitative methods. The objective of quantitative research is to describe the relationship between two or more variables [15]. The research will be conducted at two stations, namely Asrama Haji Station and Bumi Sriwijaya Station. To achieve the research objectives, it is necessary to prepare a research procedure consisting of a series of activities carried out systematically and continuously. This research procedure can be seen in Figure 1. With the existence of well-structured research procedures, it is hoped that research can be carried out more effectively and efficiently to produce accurate and relevant data. Based on Figure 1.

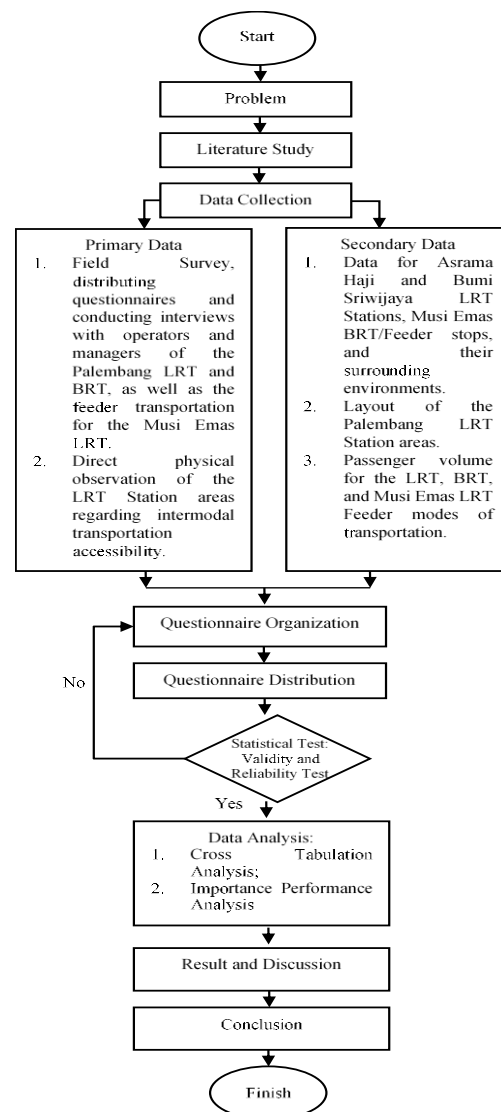


Figure 1. Research flowchart

The research procedure can be described as in the problem identification stage, the researcher searches for and understands the problem to be studied and formulates the problem formulation, research objectives, and research limitations. This allows researchers to conduct research that is more focused and effective, with maximum results.

The literature study stage was carried out to find references and theoretical foundations needed for the research. Information and sources were obtained from various sources, such as books, journals, articles, and other documents. This stage helps enrich the researcher's understanding and insight into the research topic and determine the appropriate theories and methods to answer research problems.

The data collection consists of primary and secondary data, and take place over a period of three months, starting from January to March 2023. The primary data used will consist of observational data and field measurements to determine whether the existing conditions of intermodal integration facilities comply with the established minimum service standards. The regulations for minimum service standards for physical integration facilities can be found in [Table 1](#). A survey questionnaire will be conducted to collect socio-demographic data and passenger perceptions regarding the level of service of intermodal transfer facilities. The survey will be administered to 226 respondents. As for the secondary data, it will include passenger volume data for LRT, BRT, and Musi Emas Feeder, as well as the layout of both stations.

The data processing stage is carried out to process survey results from questionnaire. The data processing stage uses two analysis methods: cross tabulation analysis and Importance Performance Analysis.

**Table 1.** Regulation of minimum service standards for integrated physical facilities of transportation modes

Intermodal facilities	Types of Intermodal Facilities	Regulation
Pedestrian Facility	Pedestrian way, <i>crossing</i> , and <i>Signage</i>	Peraturan Menteri PUPR No. 03/PRT/M/2014; Surat Edaran Menteri PUPR No. 02/SE/M/2018
Public Transit Stop Facilities	Bus Stop and Bus Shelter	Keputusan Direktur Jenderal Perhubungan Darat No. 271/HK.105/DRJD/96
Supporting Facilities	Information, Ticketing, and Payment Services Facilities.	Information services available at the nodes and accessible using mobile devices; Cash/ e-money/ e-wallet payment facilities are available.

Cross tabulation analysis is a type of tabular analysis where the observed data is displayed as a cross-tabulation. The purpose of cross tabulation is to determine whether there is a correlation or relationship between two variables. The relationship between the variables on the rows and the variables on the columns becomes the focus of this analysis. Cross tabulation analysis allows for the combination of data from different variables, whether they are ordinal or nominal variables [15].

Importance Performance Analysis (IPA) is used to compare the extent to which the performance perceived by consumers meets their desired level of satisfaction, which is depicted in a quadrant analysis [16]. In the measurement of importance and performance levels, a Likert scale is used, where attributes considered very important/satisfactory are given a value of 5, important/satisfactory attributes are given a value of 4, moderately important/satisfactory attributes are given a value of 3, less important/satisfactory attributes are given a value of 2, and not important/satisfactory attributes are given a value of 1.

The discussion stage is carried out to discuss the results of data processing, explain passenger travel characteristics, and the satisfaction and importance level of the service which indicating what improvements are needed.

The conclusion and suggestion stage are the final stage of this research, which contains conclusions from the discussion stage and suggestions for further research.

### 3. Results and Discussion

#### 3.1 Analysis of Respondents Socio-Demographics

The respondents in this research are categorized based on several factors, including gender, age, occupation, monthly income, highest level of education, purpose of travel, payment system, frequency of travel per week, and origin-destination survey. Based on the questionnaire distribution, responses were obtained from 226 respondents who are travelers at both stations. The characteristics of the respondents in this research are predominantly female (58.4%) with an age range of 23-30 years (31.4%). The majority of respondents are students (35%) with the main purpose of travel being to return home (23%) and have a monthly income of less than 1.5 million (38.5%). Most respondents have a bachelor's degree (40.3%) and travel once a week (39.8%). The largest number of respondents travel from the Ilir Barat area to Sukarami, accounting for 13.72% of the total, with ticket payments made using e-money/smartcards (82.7%). [Table 2](#) provides an overview of the respondents' demographic data in the research.

**Table 2.** Socio demographic of respondents

Characteristic	Explanation	Quantity	Percent
Gender	Male	94	41.6%
	Female	132	58.4%
Age	15 – 22	64	28.3%
	23 – 30	71	31.4%
	31 – 40	52	23.0%
	41 – 50	26	11.5%
	51 - 60	9	4.0%
	> 60	4	1.8
Occupation	Civil Servants	12	5.3 %
	Private Sector/ BUMN/ BUMD	78	34.5 %
	Teacher/ Lecturer		
	Student	10	4.4 %
	Housewife	79	35 %
	Entrepreneur	10	4.4 %
	Other	32	14.2 %
Frequency of Travel per Week		5	2.2 %
	1 time	90	39.8 %
	2 times	13	5.8 %
	3 times	32	14.2 %
	4 times	11	4.9 %
	5 times	15	6.6 %
Monthly Income	> 5 times	65	28.8 %
	< 1,5 Million	87	38.5%
	1,5-5 Million	68	30.1 %
	5-7,5 Million	41	18.1 %
	7,5-10 Million	13	5.8 %
	10-12,5 Million	14	6.2 %
Last Level of Education	>12,5 Million	3	1.3 %
	Elementary School	3	1.3 %
	Junior High School	16	7.1 %
	Senior High School	64	28.3 %
	Diploma	41	18.1 %
	Undergraduate	91	40.3 %
Purpose of Travel	Graduate	11	4.9 %
	Work	46	20.4 %
	School/ Campus	36	15.9 %
	Tourism	35	15.5 %
	Shopping	42	18.6 %
	Go home	52	23 %
	Experimenting	13	5.8 %
Payment System	Other	2	0.9 %
	Cash	35	15.5 %
	<i>E-money</i>	187	82.7 %
Knowledge about Physical Integration of 3 Modes of Transportation	<i>E-Wallet</i>	4	1.8 %
	Yes	189	83.6 %
Knowledge about Integration Payment of 3 Modes of Transportation	No	37	16.4 %
	Yes	181	80.1 %
Origin – Destination Survey (Simplified into Subdistrict in Palembang City)	No	45	19.9 %
	AAL - Banyuasin	5	2.21%
	AAL - Bukit Kecil	2	0.88%
	AAL - Ilir Barat	17	7.52%
	AAL - Ilir Timur	10	4.42%
	AAL - Jakabaring	3	1.33%
	AAL - OKU	1	0.44%
	AAL – Sako	3	1.33%
	Banyuasin - Ilir Barat	24	10.62%
	Banyuasin - Ilir Timur	4	1.77%
	Banyuasin - Sako	1	0.44%
	Banyuasin - Sukarami	7	3.10%
Bukit Kecil – Ilir Barat	8	3.54%	
Bukit Kecil - Sukarami	3	1.33%	

Characteristic	Explanation	Quantity	Percent
	Iilir Barat - Iilir Barat	11	4.87%
	Iilir Barat - Sako	4	1.77%
	Iilir Barat – Sukarami	31	13.72%
	Iilir Timur - Iilir Barat	10	4.42%
	Iilir Timur - Iilir Timur	1	0.44%
	Iilir Timur - Jakabaring	3	1.33%
	Jakabaring - Iilir Barat	11	4.87%
	Jakabaring - Sukarami	5	2.21%
	Sako - Sukarami	2	0.88%
	SU - AAL	1	0.44%
	SU - Bukit Kecil	1	0.44%
	SU - Iilir Barat	20	8.85%
	SU - Sukarami	10	4.42%
	Sukarami - AAL	5	2.21%
	Sukarami - Iilir Timur	10	4.42%
	Sukarami - Sukarami	13	5.75%

Information about Subdistrict abbreviations:

AAL : Alang – Alang Lebar; OKU : Ogan Komering Ulu; SU : Seberang Ulu

### 3.2 Cross Tabulation Analysis

The analysis results of connection between level of education and occupation of respondents show that the majority of respondents with the last education undergraduate, namely 91 people (40.27%) with the most jobs as private sector/BUMN/BUMD workers with 46 people. The results of cross tabulation can be seen in [Table 3](#).

The analysis results of connection between occupation and purpose of travel indicate that the majority of respondents

are students, with a total of 79 individuals (34.96%), and the most common purpose of travel for this group is school, with 36 individuals. The crosstabulation can be seen in [Table 4](#).

The analysis results of connection between monthly income and frequency of travel per week indicate that the majority of respondents have a monthly income of less than Rp. 1,500,000, totaling 87 individuals (38.50%), with a frequency of travel exceeding 5 times per week. The crosstabulation results between monthly income and frequency of travel per week can be seen in [Table 5](#).

**Table 3.** Combination between level of education and occupation

Education Level	Occupation							Total	Percent (%)
	Teache r	Housewif e	Studen t	Entreprene ur	Civil Servant	Private Sector	Other		
Elementary School	0	0	0	1	1	1	0	3	1.33
Junior High School	0	0	13	1	0	2	0	16	7.08
Senior High School	1	5	34	10	1	13	0	64	28.32
Diploma	0	5	9	14	1	12	0	41	18.14
Undergraduate	5	0	20	6	9	46	5	91	40.27
Graduate	4	0	3	0	0	4	0	11	4.87
Total	10	10	79	32	12	78	5	226	100

**Table 4.** Combination of occupation and purpose of travel

Occupation	Purpose							Total	Percent (%)
	Work	Shopping	Experimenting	Go home	School	Tourism	Other		
Teacher	7	2	0	1	0	0	0	10	4.42
Housewife	0	6	0	2	0	2	0	10	4.42
Student	3	5	5	18	36	12	0	79	34.96
Entrepreneur	13	3	0	7	0	7	2	32	14.16
Civil Servant	5	3	3	1	0	0	0	12	5.31
Private Sector	18	22	2	22	0	14	0	78	34.51
Other	0	1	3	1	0	0	0	5	2.21
Total	46	42	13	52	36	35	2	226	100

**Table 5.** Combination of monthly income and frequency of travel per week

Income (Million)	Frequency (Times)						Total	Percent (%)
	1	2	3	4	5	>5		
Under 1,5	25	4	20	4	4	30	87	38.50
1,5 – 5	31	5	6	2	3	21	68	30.09
5 – 7,5	14	4	3	3	4	13	41	18.14
7,5 – 10	8	0	1	1	2	1	13	5.75
10 - 12,5	9	0	2	1	2	0	14	6.19
> 12,5	3	0	0	0	0	0	3	1.33
Total	90	13	32	11	15	65	226	100

**Table 6.** Combination of origin-destination and purpose of travel

Origin Destination	Purpose of Travel							Total	Percent (%)
	Work	Shopping	Experimenting	Go home	School	Tourism	Other		
AAL – Banyuasin	1	0	3	0	1	0	0	5	2.21
AAL – Bukit Kecil	0	1	0	0	1	0	0	2	0.88
AAL – Ilir Barat	2	1	4	6	2	2	0	17	7.52
AAL – Ilir Timur	1	1	2	3	1	2	0	10	4.42
AAL – Jakabaring	0	1	0	0	1	1	0	3	1.33
AAL – OKU	0	1	0	0	0	0	0	1	0.44
AAL – Sako	0	1	1	0	0	1	0	3	1.33
Banyuasin – Ilir Barat	4	5	3	3	5	4	0	24	10.62
Banyuasin – Ilir Timur	2	0	0	1	0	0	1	4	1.77
Banyuasin – Sako	0	0	0	0	0	0	1	1	0.44
Banyuasin – Sukarami	5	1	0	0	0	1	0	7	3.10
Bukit Kecil – Ilir Barat	0	2	0	1	0	5	0	8	3.54
Bukit Kecil – Sukarami	1	1	0	0	0	1	0	3	1.33
Ilir Barat – Ilir Barat	5	0	0	0	2	4	0	11	4.87
Ilir Barat - Sako	0	1	0	2	0	1	0	4	1.77
Ilir Barat – Sukarami	10	4	0	11	6	0	0	31	13.72
Ilir Timur – Ilir Barat	1	0	0	2	7	0	0	10	4.42
Ilir Timur – Ilir Timur	0	0	0	1	0	0	0	1	0.44
Ilir Timur – Jakabaring	0	0	0	1	2	0	0	3	1.33
Jakabaring – Ilir Barat	7	0	0	4	0	0	0	11	4.87
Jakabaring – Sukarami	0	5	0	0	0	0	0	5	2.21
Sako – Sukarami	0	1	0	0	0	1	0	2	0.88
Seberang Ulu – AAL	0	0	0	0	0	1	0	1	0.44
Seberang Ulu – Bukit Kecil	0	0	0	0	0	1	0	1	0.44
Seberang Ulu – Ilir Barat	1	10	0	0	0	9	0	20	8.85
Seberang Ulu – Sukarami	3	0	0	7	0	0	0	10	4.42
Sukarami – AAL	0	2	0	3	0	0	0	5	2.21
Sukarami – Ilir Timur	0	0	0	4	5	1	0	10	4.42
Sukarami – Sukarami	3	4	0	3	3	0	0	13	5.75
Total	46	42	13	52	36	35	2	226	100

The analysis results of connection between origin-destination and purpose of travel indicate that the majority of respondents travel from the Ilir Barat area to the Sukarami area or vice versa, with a total of 31 individuals (13.72%), and the most common purpose of travel for this group is to go home, with 11 individuals. The crosstabulation results between Origin-Destination and Purpose of Travel can be seen in [Table 6](#).

### 3.3 Importance Performance Analysis (IPA)

The Importance Performance Analysis (IPA) method is used to analyze the perceived level of performance and importance by service users regarding the quality of

intermodal integration facilities in both station areas. Additionally, this method is utilized to identify prioritized service attributes for improving physical intermodal integration facilities through proposed design suggestions. Based on [Table 7](#), it can be concluded that to determine the average values of performance level and importance level for intermodal physical integration, ticket payment integration, and schedule integration at the Asrama Haji and Bumi Sriwijaya Station, an analysis using the Importance Performance Matrix can be conducted. The analysis of the Importance Performance Matrix resulted in an average X value (3.23) and an average Y value (4.51) used as axes. The position of these attributes is analyzed in quadrant 1, as shown in [Figure 1](#).

**Table 7.** The results analysis of importance and performance levels in the questionnaire

No	Attribute	Performance (X)	X Average	Importance (Y)	Y Average	Level of Suitability
1	BRT and Musi Emas Feeder have bus stops available within 400 meters, which can be reached on foot.	711	3.15	1020	4.51	70%
2	The walking time to LRT Station, BRT Bus Stop, and Musi Emas Feeder is less than 10 minutes.	698	3.09	1045	4.62	67%
3	There are connected pedestrian sidewalks available from LRT to BRT and vice versa.	573	2.54	1040	4.60	55%
4	There are connected pedestrian sidewalks available from LRT to Musi Emas Feeder and vice versa.	587	2.60	1042	4.61	56%
5	There are connected pedestrian sidewalks available from BRT to Musi Emas Feeder and vice versa.	631	2.79	999	4.42	63%
6	There are dedicated bicycle lanes available leading to bus stops and LRT stations.	614	2.72	887	3.92	69%
7	There are bicycle parking facilities available at the LRT stations and bus stops.	692	3.06	912	4.04	76%
8	There are waiting lounge facilities available at the stations.	969	4.29	1069	4.73	91%
9	There are waiting lounge facilities available at the BRT bus stops and Musi Emas Feeder stops.	546	2.42	1067	4.72	51%
10	The schedule of departures and arrivals for LRT is well-organized, and accessing information about schedules and destinations is easily obtainable.	954	4.22	1093	4.84	87%
11	The departure and arrival schedules are well-regulated, and accessing information is convenient and easily available.	668	2.96	1081	4.78	62%
12	Information about other modes of transportation	623	2.76	1046	4.63	60%
13	Information about fares for other modes of transportation	665	2.94	1021	4.52	65%
14	Price/ Cost	906	4.01	1005	4.45	90%
15	The number of operational one-trip ticket counters.	933	4.13	955	4.23	98%
16	The one-trip ticket sales service and the speed of service at the ticket counters.	944	4.18	987	4.37	96%
17	The availability of e-money facilities, smartcards.	978	4.33	1038	4.59	94%
18	The ease of e-money facilities, smartcards.	891	3.94	1046	4.63	85%
19	The ease of using e-money facilities, smartcards.	966	4.27	1055	4.67	92%
20	The ease of top up e-money facilities, smartcards.	950	4.20	1052	4.65	90%
21	The availability of e-wallet facilities, QRIS.	967	4.28	1037	4.59	93%
22	The ease of using e-wallet facilities, QRIS.	962	4.26	1051	4.65	92%
23	There are Kiss and Ride facilities or designated drop-off and pick-up zones for passengers.	546	2.42	1045	4.62	52%
24	There are parking facilities available for four-wheeled motor vehicles in the transit zone.	514	2.27	949	4.20	54%
25	There are parking facilities available for two-wheeled motor vehicles in the transit zone.	524	2.32	959	4.24	55%
26	There are directional signs and easily visible location indicators available.	619	2.74	1014	4.49	61%
27	There are easily accessible public pedestrian pathways.	612	2.71	1034	4.58	59%
28	There are facilities such as stairs, elevators, and escalators available for vertical accessibility.	866	3.83	1046	4.63	83%
29	There are facilities available for people with disabilities on pedestrian pathways.	613	2.71	1070	4.73	57%

No	Attribute	Performance (X)	X Average	Importance (Y)	Y Average	Level of Suitability
30	The width, type of material, and gradient (slope) of pedestrian pathways from the road surface.	590	2.61	1016	4.50	58%
31	Temperature control	770	3.41	954	4.22	81%
32	Lighting control	818	3.62	957	4.23	85%
33	Prayer Facility ( <i>Musholla</i> )	918	4.06	996	4.41	92%
34	Areas with internet connectivity	793	3.51	948	4.19	84%
35	Battery charging facilities	893	3.95	989	4.38	90%
36	Toilet facilities (Number and cleanliness of toilets)	925	4.09	1045	4.62	89%
37	Nursery Room Facility	901	3.99	986	4.36	91%
38	There are pedestrian crossing facilities available between station and bus stops.	543	2.40	1063	4.70	51%
39	The entrance and exit access from the station to the bus stop, or vice versa, are free from traffic conflicts.	551	2.44	1070	4.73	51%
40	There are barrier fences available to separate pedestrian pathways from motorized vehicle.	562	2.49	1022	4.52	55%
41	There are road markings, signs, and traffic lights available to control vehicle speed limits.	565	2.50	1026	4.54	55%
42	Visual attractiveness along the intermodal access in the station area.	594	2.63	990	4.38	60%
43	There are facilities available for shade from the sun and rain.	586	2.59	1039	4.60	56%
44	There are open spaces available that are free from illegal street vendors or kiosks.	625	2.77	1019	4.51	61%
45	There is drainage available to ensure that roads and pedestrian pathways are free from flooding.	628	2.78	1064	4.71	59%
46	The availability of lighting facilities.	676	2.99	1062	4.70	64%
47	There is sufficient availability of surveillance camera (CCTV) facilities around the station and bus stop areas.	653	2.89	1083	4.79	60%
48	The availability of security personnel around the station and bus stop areas.	662	2.93	932	4.12	71%
49	The availability of lost and found facilities.	780	3.45	1001	4.43	78%
Average		729.69	3.23	1018.92	4.51	72%

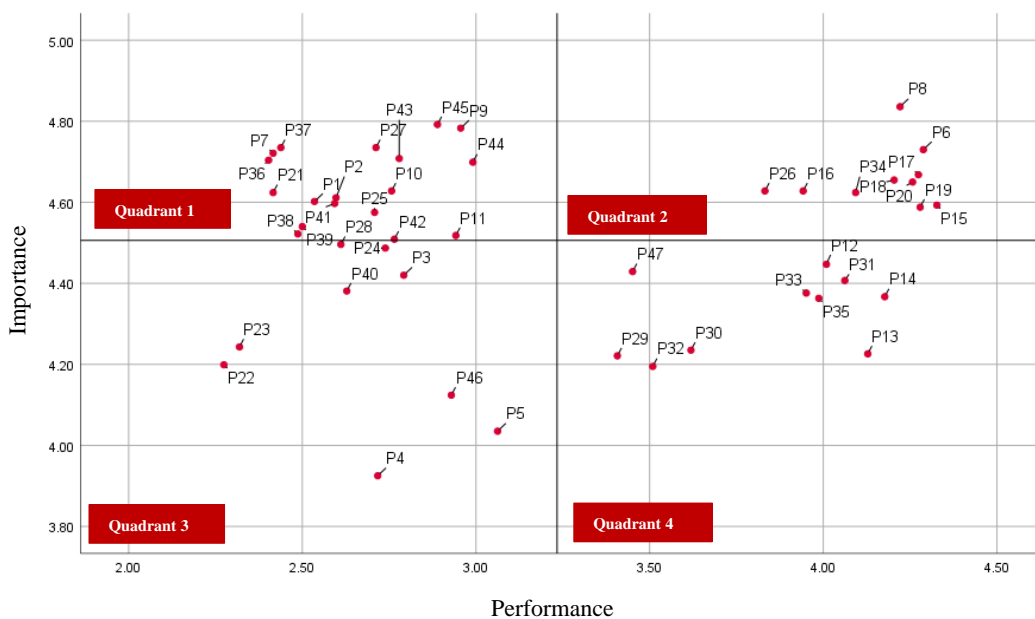


Figure 2. Attribute position based on importance performance analysis in 4 quadrants



In **Figure 2** of the Importance Performance Analysis (IPA) matrix, the positions of the attribute variables can be observed in each quadrant, which are quadrant 1 is top priority. In this quadrant, the satisfaction level of the service is important or very important, but the importance level of the service is still low or not good, indicating that improvements are needed. There are 20 attributes included in quadrant 1, such as the availability of BRT and Musi Emas Feeder bus stops (<400 m) that can be reached by walking (P1), walking time to LRT Station, BRT Bus Stop, and Musi Emas Feeder is less than 10 minutes (P2), connected pedestrian sidewalks available from LRT to BRT and vice versa (P3), connected pedestrian sidewalks available from LRT to Musi Emas Feeder and vice versa (P4), the availability of waiting lounge facilities at BRT bus stops and Musi Emas Feeder stops (P9), the regularity of departure and arrival schedules and ease of access to information (P11), information about other modes of transportation (P12), information about fares for other modes of transportation (P13), unobstructed access from the station to the bus stop or vice versa, free from traffic disturbances or conflicts (P39), availability of pedestrian crossing facilities from the terminal to the station or vice versa (P38), availability of Kiss and Ride facilities/drop-off and pick-up zones for passengers (P23), availability of easily accessible public pedestrian pathways (P27), availability of facilities for people with disabilities on pedestrian pathways in the station and bus stop areas (P29), presence of barrier fences to separate pedestrian pathways from motor vehicle traffic (P40), availability of road markings, signs, and traffic lights to control vehicle speed (P41), availability of shade facilities from sun, rain, and while waiting for public transportation (P43), availability of open spaces free from street vendors/hawkers or kiosks (P44), provision of drainage to keep roads and pedestrian pathways free from flooding or water pooling (P45), availability of lighting facilities (P46), and sufficient availability of surveillance camera (CCTV) facilities around the station and bus stop areas (P47).

Quadrant 2 is maintain performance. This quadrant indicates that the satisfaction level of the service is important or very important, and the importance level of the service is already good or very good, so this condition should be maintained. There are 10 attributes included in quadrant 2, such as the availability of waiting lounge facilities at the station (P8), the regularity of departure and arrival schedules for LRT (P10), the availability of e-money/smartcard/tap card facilities (P17), the ease of e-money/smartcard/tap card facilities (P18), the ease of using e-money/smartcard/tap card facilities (P19), the ease of topping up/recharging e-money/smartcard/tap card

facilities (P20), the availability of e-wallet/QRIS/scan barcode facilities (P21), the ease of using e-wallet/QRIS/scan barcode facilities (P22), the availability of stairs, elevators, and escalators/Vertical Accessibility (P28), and toilet facilities (P36).

Quadrant 3 is low priority. In this quadrant, the satisfaction level of the service is less important, and the importance level of the service is still low or not good, indicating that the importance level of the service can be improved. There are 9 attributes included in quadrant 3, such as connected pedestrian sidewalks available from BRT to Musi Emas Feeder and vice versa (P5), dedicated bicycle lane available to bus stops and LRT Station (P6), availability of bicycle parking facilities in the LRT station and bus stops area (P7), availability of parking facilities for four-wheeled motor vehicles in the station and bus stop areas (P24), availability of parking facilities for two-wheeled motor vehicles (P25), availability of directional signs and easily visible location indicators (P26), width, type of material, and gradient (slope) of pedestrian pathways from the road surface (P30), visual attractiveness along the intermodal access in the station area (P42), and the availability of security personnel in and around the station and bus stop areas (P48).

Quadrant 4 is excessive conditions. This quadrant indicates that the satisfaction level of the service is less important, but the importance level of the service is already good or very good. There are 10 attributes included in quadrant 4, such as price (P14), the number of operational one-trip ticket counters (P15), the service of selling one-trip tickets and the speed of service at the ticket counters (P16), temperature control/regulation (P31), lighting control/regulation (P32), worship facilities (P33), areas with internet connectivity (P34), battery charging facilities (P35), breastfeeding room facilities (P37), and the availability of baggage storage or lost and found facilities (P49).

#### 4. Conclusions

The characteristics of the respondents in this research were predominantly female (58.4%) with an age range of 23-30 years (31.4%). The majority of respondents were students (35%) and their main purpose of travel was to return home (23%). About 38.5% of respondents had a monthly income of less than 1.5 million. Most respondents had a highest education level of Bachelor's degree (S1/D4) (40.3%) and traveled once a week (39.8%). The majority of respondents traveled from Ilir Barat area to Sukarami with a percentage of 13.72%, and they used e-money/smartcard as the payment method for tickets (82.7%).

The cross-tabulation analysis of the relationship between education level and occupation shows that 40.27% of respondents who transit at both stations have a Bachelor's degree (S1/D4), and the majority of them work in private companies/ state-owned enterprises/ regional-owned enterprises, totaling 46 individuals. The relationship between occupation and purpose of travel indicates that 34.96% of respondents are students, and the main purpose of their travel is for school, with a total of 36 individuals. The relationship between income level and frequency of travel in a week shows that 38.50% of respondents have an income below Rp 1,500,000, and they travel more than 5 times a week, with a total of 30 individuals. Finally, the relationship between origin-destination and purpose of travel indicates that 13.72% of respondents travel from Ilir Barat area to Sukarami (vice versa), and the main purpose of their travel is to return home, with a total of 31 individuals.

Passengers perceptions of the level of service for physical integration facilities, payment, and schedules using the IPA method indicate that out of the 49 examined service attributes, 20 service attributes have low performance but high importance/ top priority. The analysis results show three needs for improving the provision of physical integration services. First, the provision of adequate and disability-friendly sidewalk facilities. Second, the provision of crossing facilities. Third, the access to and from the nodes that are free from traffic conflicts. Recommended solutions include the construction of connected sidewalks that are elevated from the road surface, installation of directional tiles, barrier poles, and ramps at each end of the sidewalks, construction of a pedestrian overpass (JPO) at Asrama Haji Station and a pelican crossing at Bumi Sriwijaya Station, and regulation of the transit area to prevent parking and waiting of vehicles at the node's entrance and exit.

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