

## **Evaluation of Semi BRT Services Utilizing Importance Performance Analysis (IPA) in Yogyakarta, Surakarta, and Semarang-Indonesia**

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**Abstract:** Based on some information through media and previous study, the existing condition of semi BRT operational performances in three big cities: Yogyakarta, Surakarta and Semarang is need to be evaluated. This study has aimed to evaluate the operational performance of Semi BRT in these three big cities, based on perception of bus user. Method of Importance Performance Analysis (IPA) has been applied in this study to observe the operational performance of existing semi BRT. The interview has been done with 100 respondents for each city. The result of this study shows that the service needs to be improved by semi BRT management are the availability of medical-aid box, integration service with other transport modes, and ticketing system. The suggestion for BRT management in has to put priority on a strategy to have integrating semi BRT with other transportation modes and give a subsidy for tariff.

**Keywords:** Semi BRT, Operational Performance, Yogyakarta, Surakarta and Semarang

### **1. INTRODUCTION**

Some urban transport issues in Indonesia is include rapid population growth, an inefficient provision of transport supply with transport demand, and the growth of private vehicles that causing a very high growth in fuel consumption, as well as the increase in air pollution (Abubakar, 1996). Therefore one of the solution is through urban public transport policies by supplying public transport modes such as buses, usually called BRT (Bus Rapid Transit). BRT is an innovative bus system with high frequency and speed, comfortable, have special lanes, higher capacity, and affordable costs.

Jakarta is the only city in Indonesia that have operated the full BRT. However the big cities of Yogyakarta, Solo and Semarang has applied BRT but without special lane like in Jakarta, sometimes called as “semi BRT” . In order for the semi BRT management improve the services, it is better to evaluate the operational performance of semi BRT in these three cities.

The Yogyakarta City with the population about half a millions, is one of the district under the Province of Yogyakarta. Surakarta and Semarang are located in Province of Central Java. Yogyakarta is operating Trans-Jogja as the first semi BRT in Indonesia with Batam City. Recent data from Yogyakarta City Office of Transportation shows that the number of public transport user, including semi BRT is getting less and less (Sriwidodo, 2010). Surakarta, with the population of 600 thousands, has Trans Batik Solo as a semi BRT. The situation of operational performance of Trans Batik Solo is the same with Yogyakarta City that there is a declining operational performance which result in a decrease in the number of passengers. Semarang, the capital of Central Java Province, has 1.5 million inhabitants. Semarang city already has semi BRT since 2009. However, the service area of existing semi BRT Trans Semarang could not reach some public transport demand in Semarang. Previous research has

been done on the evaluation of BRT, however none of researcher did on semi BRT system like in these three cities (Supriyanto, 2003; Rini, 2007; Dai, 2011; Suprayitno, 2016). Therefore it is importance to evaluate the operational performance of semi BRT in these three cities, to give a recommendation for semi BRT management on appropriate regulatory policy for improving semi BRT service. The purpose of this research is to evaluate the existing operational performance of semi BRT in the city of Yogyakarta, Surakarta and Semarang. This paper is only explaining the initial step to evaluate semi-BRT, and the next research is to make a new minimum level of service standard for semi-BRT, since the Indonesian Government only has a BRT's minimum level of service standard. This research is a part of IRG-EASTS research on "Viability of Public Transport Harmonizing System with Para-Transit Modes", and semi-BRT is one of the option for future public transport in Asia which is low-cost in construction and could become the main line or the backbone of city's public transport (Wicaksono et al, 2015).

## 2. METHODS

This research is an explanatory research to observe the operational performance of semi BRT in Yogyakarta, Surakarta and Semarang. The study is designed to have several stages:

1. First of all, preliminary data collection has to be done with interview to 30 passengers of semi BRT each in Yogyakarta, Surakarta and Semarang Cities (Sugiyono, 2009).
2. Designing a final questionnaire by accommodating attribute services as a result from preliminary study with passenger perception of semi BRT.
3. Distributing questionnaire to respondents in all three cities: Yogyakarta, Surakarta and Semarang. Questionnaire covers: operational performance, regulation, management and service of semi BRT. The number of respondents for each city is 100 and selected at random.
4. Data compilation, and descriptive analysis of the survey data.
5. Analyzing the data use methods of Importance Performance Analysis (IPA) to get which attributes that the customer need to improve.

The survey has been done using interview methods using questionnaire done at semi-BRT bus-stop and terminal. Briefing has been done to the interviewer on how to conduct the interview with respondents. Accidental sampling method has been used to select the respondent, that's mean it is depend on the willingness of respondent to fill the questionnaire or will be interviewed, or will refuse the interview. After checking the questionnaire, data has been compiled using tabularized method. Three characteristics of respondents (age, gender and job/occupation) can be seen in Table 1. It is shown that majority of user is at the productive age (23-57 years), while the gender is almost equal between man and woman, and most of the respondent's position is a student.

The research framework concept can be seen in Figure 1, while the attribute use in this research applying Importance Performance Analysis is taken from previous study (Sriwidodo, 2010; Ockwell, 2001), the regulation on Minimum Service Level Standard of BRT in Indonesia and discussion with several respondents during preliminary survey (Table 2). The Questionnaire of IPA applying to evaluate the operational performance of Semi BRT, consists of 26 attributes that classified into 4 groups of variable, these are management, regulation, performance and service.

Table 1. Descriptive of respondents

		Yogyakarta	Solo	Semarang
Age	13-22	15	11	11
	23-32	9	7	9
	33-42	13	8	5
	43-57	11	17	21
	58-67	3	6	7
	68-	0	1	0
Gender	Man	51	50	53
	Woman	49	50	47
Job	Gov. Servant	26	17	16
	Private Company	11	9	13
	Student	24	24	22
	Military & Police	11	11	10
	State Owned Co.	21	19	19
	Others	7	20	20

Table 2. Attribute of Semi Bus Rapid Transit (BRT)

No	Attributes Classification	No	Attribute Classification
<b>A</b>	<b>Performance</b>	<b>D</b>	<b>Services</b>
1	Arrival time appropriateness	1	Safety aspect of bus
2	Waiting time	2	Medical-aid box
3	Departure times punctuality	3	Information on transport integration at destination bus stop
4	Operating service time	4	Complaints handling mechanism in bus
		5	Quick response officers
<b>B</b>	<b>Management</b>	6	Officer's courtesy, friendly & dress code
1	Bus stops accessibility	7	Officers skills and abilities to help
2	Integration with other transport modes	8	Officer's open service time
3	Affordability of tariff	9	Ticketing services
4	Facilities management	10	No smoke and bad-odor
<b>C</b>	<b>Regulation</b>	11	Security at bus stops
1	Special lane for bus	12	Security inside bus
2	Control of bus operation	13	Noise and glass glare inside bus
3	Safety tools/equipment	14	Cleanliness surrounding bus stop
		15	Cleanliness in bus stop

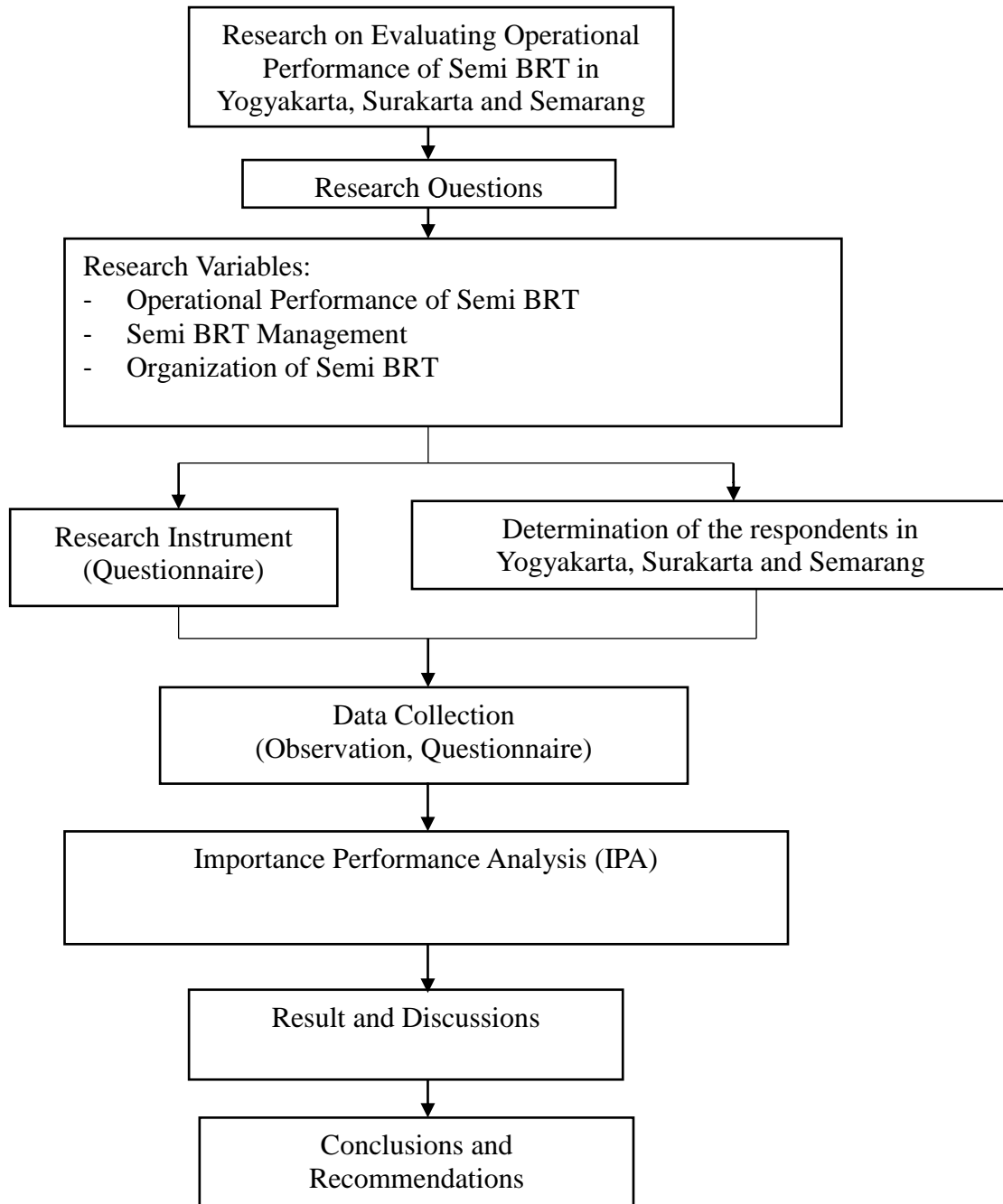


Figure 1. Research Framework Concept

### 3. RESULTS AND DISCUSSIONS

Applying the Importance Performance Analysis on the data, the quadrant analysis could be done easily. The quadrant consist of two axis, the average mean of satisfaction level put as X axis, while the average mean of importance level put as Y axis. Hereby the analysis will be done for each city first, then we analyze the comparison among three cities.

**a. Importance Performance Analysis Result on Semi BRT in Yogyakarta City**

The results of quadrant analysis on the IPA attribute for Semi BRT in Yogyakarta can be seen in Figure 2. The analysis shows that the arithmetic mean of importance level (Y) is 3.27, whereas the arithmetic mean of satisfaction level (X) is 3.3. The Importance Performance Analysis has divided all the attributes into four quadrants. The result of analysis on each attributes has classified as can be seen in Table 3.

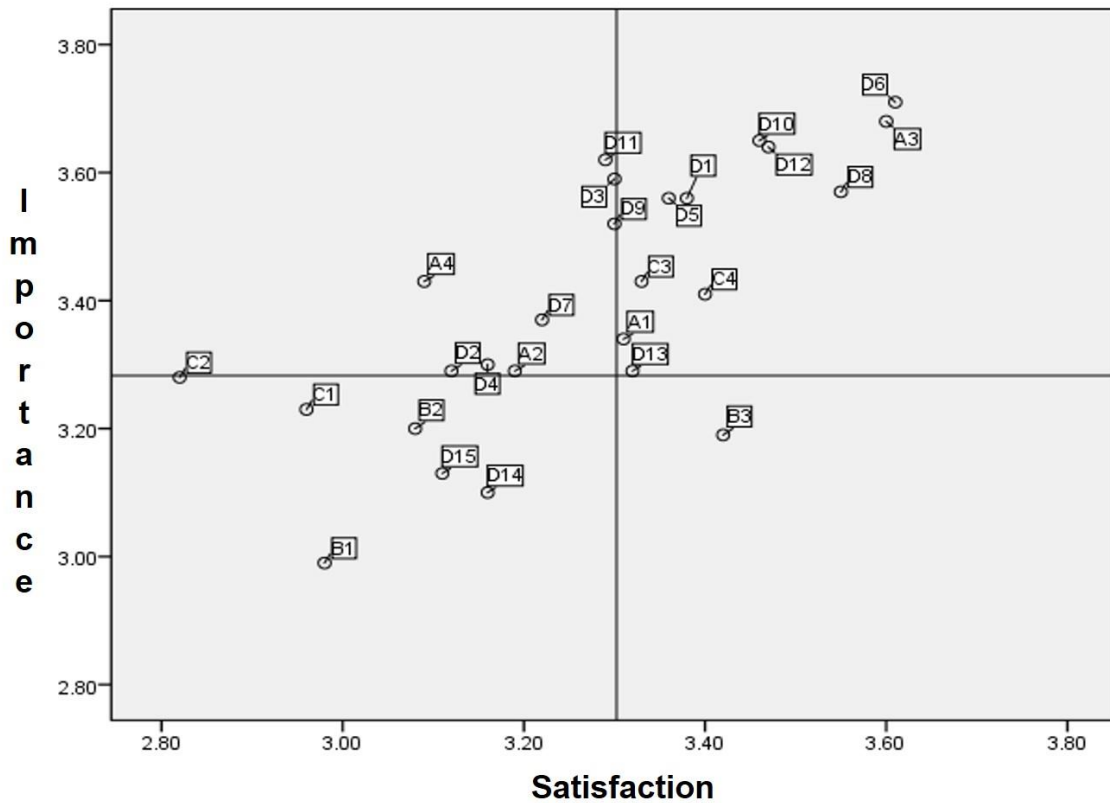


Figure 2. Results of Important Performance Analysis on Semi BRT in Yogyakarta city

Table 3. Attribute Classification based on IPA for Semi BRT in Yogyakarta City

Quadrant	Attribute
I : High priority to improve	: A2, A4, D2, D3, D4, D7, D9, D11
II : Maintain good service	: A1, A3, C3, D1, D5, D6, D8, D10, D12, D13
III : Low priority to improve	: B1, B2, C1, C2, D14, D15
IV : Better than adequate	: B3

The high priority attribute that Semi BRT in Yogyakarta has to be improved are:

- a) Waiting time (A2), as the existing headway is about 15-30 minutes, the passenger need to have more frequent of services
- b) Operating service time (A4), as the Trans-Jogja operating services time nowadays is not 24 hours, therefore passengers need to have more operation time.

- c) Medical-aid box (D2), as the existing Trans-Jogja have no medical-aid box in service.
- d) Information on transport integration at destination bus stop (D3), as inside Trans Jogja bus do not have information on what transport terminal located close to each bus stops.
- e) Complaint handling mechanism (D4), there is no such system to handle complaint inside the bus of Trans Jogja.
- f) Officers skills and abilities to help (D7), most of passenger has experience that the officers is unwilling to help them.
- g) Ticketing service (D9), as the ticketing is mostly use paper ticket, while the electronic ticket sometimes have trouble in the system.
- h) Security at bus stops (D11), as there is no security or guard at most of the bus stops.

**b. Importance Performance Analysis Result on Semi BRT in Surakarta City**

The results of quadrant analysis on the IPA attribute for Semi BRT in Surakarta can be seen in Figure 3. The analysis shows that the arithmetic mean of importance level (Y) is 3.61, whereas the arithmetic mean of satisfaction level (X) is 3.34. The Importance Performance Analysis has divided all the attributes into four quadrants. The result of analysis on each attributes has classified as can be seen in Table 4.

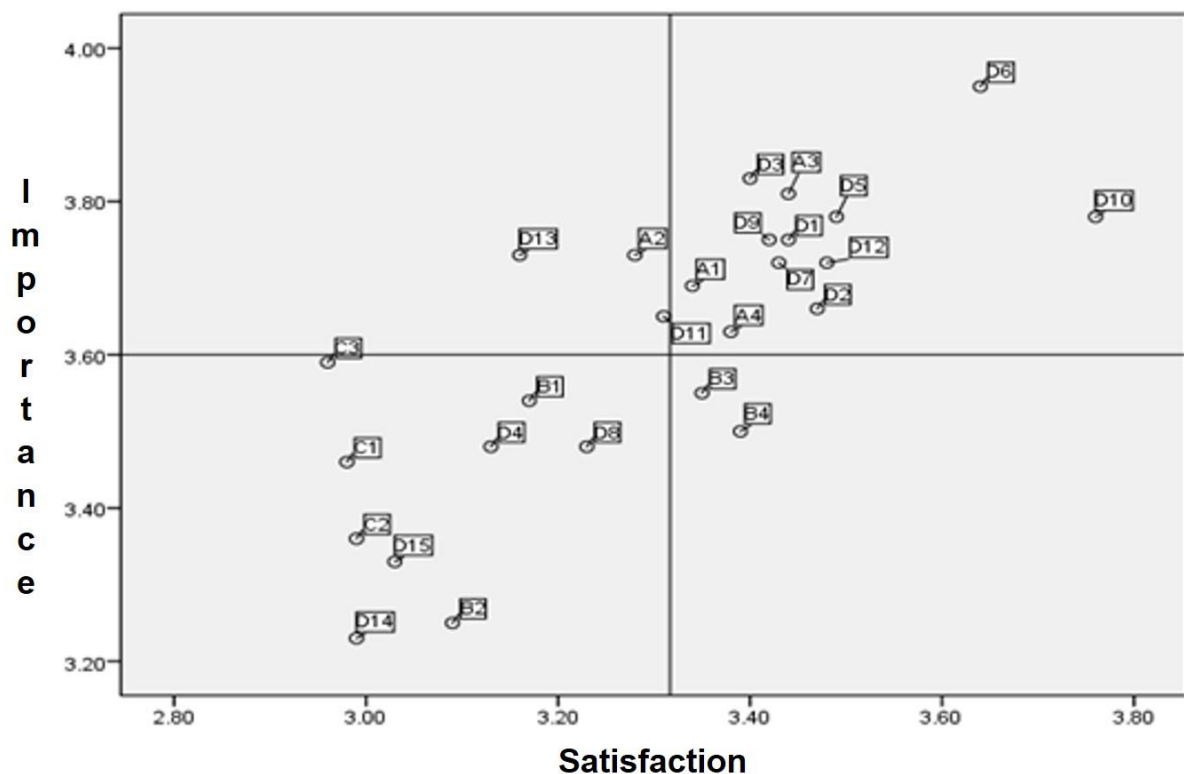


Figure 3. Results of Important Performance Analysis on Semi BRT in Surakarta City

Table 4. Attribute Classification based on IPA for Semi BRT in Surakarta City

Quadrant	Attribute
I : High priority to improve	: A2, D11, D13
II : Maintain good service	: A1, A3, A4, D1, D2, D3, D5, D6, D7, D9, D10, D12
III : Low priority to improve	: B1, B2, C1, C2, C3, D4, D8, D14, D15
IV : Better than adequate	: B3, B4

The high priority attribute that Semi BRT in Surakarta has to be improved are:

- a. Waiting time (A2), as the existing headway is about 15-30 minutes, the passenger need to have more frequent of services
- b. Security at bus stops (D11), as there is no security or guard at most of the bus stops.
- c. Noise and glass glare inside bus (D13), since the bus is somehow noisy and no windows film are applied.

**d. Importance Performance Analysis Result on Semi BRT in Semarang City**

The results of quadrant analysis on the IPA attribute for Semi BRT in Semarang can be seen in Figure 4. The analysis shows that the arithmetic mean of importance level (Y) is 3.61, whereas the arithmetic mean of satisfaction level (X) is 3.34. The Importance Performance Analysis has divided all the attributes into four quadrants. The result of analysis on each attributes has classified as can be seen in Table 5.

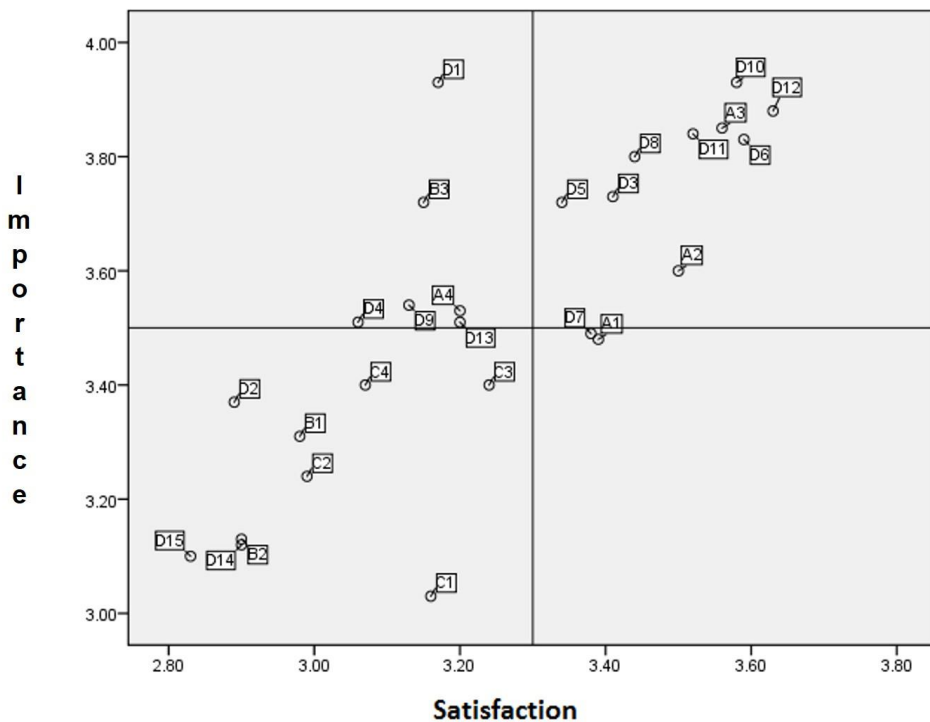


Figure 4. Results of Important Performance Analysis on Semi BRT in Semarang city

Table 5. Attribute Classification based on IPA for Semi BRT in Semarang city

<b>Quadrant</b>	<b>Attribute</b>
I : High priority to improve	: A4, B3, D1, D4, D9, D13
II : Maintain good service	: A2, A3, D3, D5, D6, D8, D10, D11, D12
III : Low priority to improve	: B1, B2, C1, C2, C3, D2, D14, D15
IV : Better than adequate	: A1, D7

The high priority attribute that Semi BRT in Semarang has to be improved are:

- a) Operating service time (A4), as the Trans-Semarang operating services time nowadays is not 24 hours, therefore passengers need to have more operation time.
- b) Affordability of Tariff (B3), as the cost of Trans-Semarang consider relatively high for the people of Semarang City
- c) Safety aspect of bus (D1), since the Trans Semarang driver sometimes tend to drive carelessly
- d) Complaint handling mechanism (D4), there is no such system to handle complaint inside the bus of Trans Semarang.
- e) Ticketing service (D9), as the ticketing is mostly use paper ticket, while the electronic ticket sometimes have trouble in the system.
- f) Noise and glass glare inside bus (D13), since the bus is somehow noisy and no windows film applied.

#### **d. Comparison on the result of IPA on Semi BRT in Yogyakarta, Surakarta and Semarang City**

Finally, we did a comparison among three cities: Yogyakarta, Surakarta and Semarang, as can be seen in Table 6. The high priority attribute that central government of Indonesia shall give attention are:

- a. Waiting time BRT (A2)
- b. Operating service time (A4)
- c. Affordability of tariff (B3)
- d. Safety aspect of bus (D1)
- e. Medical-aid box (D2)
- f. Information on transport integration at destination bus stop (D3)
- g. Complaints handling mechanism in bus (D4)
- h. Officer's skill and ability to help (D7)
- i. Ticketing Services (D9)
- j. Security at bus stops (D11)
- k. Noise and glare inside the bus (D13)

The improvement of such aspect is needed in order to increase or at least maintain the number of semi-BRT users. Otherwise, the user will change to use private vehicle, especially



motorcycle. The Government of Indonesia shall set up a minimum level of service standard for semi BRT. While at the same time, the government shall also introducing new measure to restraint the use of private vehicle, such as high parking rate, limit the number of parking space and the most important is to impose the strict rule in order to push people to changing the transport mode, from private vehicle to public transport.

Table 6. High Priority to improve Semi BRT operational performance in Yogyakarta, Surakarta and Semarang City

No.	Attribute	Yogyakarta	Surakarta	Semarang
A1	Arrival time appropriateness			
A2	Waiting time	√	√	
A3	Departure time punctuality			
A4	Operating service time	√		√
B1	Bus stops accessibility			
B2	Integration with other transport mode			
B3	Affordability of tariff			√
B4	Facilities management			
C1	Special lane for bus			
C2	Control of bus operation			
C3	Safety tools/equipment			
D1	Safety aspect of bus			√
D2	Medical-aid box	√		
D3	Information on transport integration at destination bus stop	√		
D4	Complaints handling mechanism inside bus	√		√
D5	Quick response officer			
D6	Officer's courtesy, friendly & dress code			
D7	Officer's skill and ability to help	√		
D8	Office open service time			
D9	Ticketing service	√		√
D10	No smoke and bad odor			
D11	Security at bus stops	√	√	
D12	Security inside bus			
D13	Noise and glass glare inside bus		√	√
D14	Cleanliness surrounding bus stop			
D15	Cleanliness inside bus stop			

## 5. CONCLUSIONS

In this study, the method of interview has been done with 300 respondents, who are the user of semi BRT in Yogyakarta, Surakarta and Semarang. Most of the respondents are at the productive age of 23 to 57 years, gender is equal between male and female, while the status for most of them are student. After applying the Importance Performance Analysis, it can be concluded hereby:

### **a. Improvement for Semi BRT in Yogyakarta City**

The high priority attribute that Semi BRT in Yogyakarta has to be improved are: (a) Waiting time, (b) Operating service time, (c) Medical-aid box, (d) Information on transport integration at destination bus stop, (e) Complaint handling mechanism, (f) Officers skills and abilities to help, (g) Ticketing service, (h) Security at bus stops.

### **b. Improvement for Semi BRT in Surakarta City**

The high priority attribute that Semi BRT in Surakarta has to be improved are: (a) Waiting time, (b) Security at bus stops, (c) Noise and glass glare inside bus.

### **c. Improvement for Semi BRT in Semarang City**

The high priority attribute that Semi BRT in Semarang has to be improved are: (a) Operating service time, (b) Affordability of Tariff, (c) Safety aspect of bus, (d) Complaint handling mechanism, (e) Ticketing service, and (f) Noise and glass glare inside bus.

The implication of this research is mostly on the need to improve the service to semi-BRT passenger in Indonesia, while there is a need on setting up a semi BRT minimum level of service standard, since most of Indonesia cities will apply semi-BRT as the main public transport backbone.

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