User Assessment of Quality Service of Trans Jateng Bus Stops, in Sub-Urban Corridor (Ungaran-Bawen)

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Abstract. This paper focuses on the provision of bus stop facilities provided by the Trans Jateng, a BRT-claimed bus system provided by Central Java Province that connecting southern periphery of Metropolitan Semarang to the urban core. One of their functions is to increase public interest in using public transportation in their daily transportation among the city center to the periphery vice versa. The study aim is to assess the quality of service of the bus stop in the sub-urban corridor from Ungaran to Bawen based on the user opinion and perception, which are analyzed by using 5-rating Likert scale gathered from interviews conducted by using questionnaires. There are three variables used in this study: location, physic, and service level. The result reveals the service quality of the bus stops is 2.94 so it tends to be quite good with the value of the three variables are 3.29 (good enough), 2.52 (not good) and 3.01 (good enough) respectively. They turn out input and provide suggestions to improve the bus stop services in their physical aspect as well as their location. The improvement is expected could increase public preferences on public transportation utilization, especially in their travel between city center to the periphery vice versa. The shifting private to public transportation is needed to reduce vehicle emissions that could support a more sustainable development in Semarang Metropolitan Development.

Keyword: BRT, public transportation, vehicle emissions

1. Introduction

Cities develop as humans improve their quality of life, and they grow along with the civilization of human life [1]. Todaro [2] cited in Kumurur [3] said even though development could be defined, in the broad sense, as the ability of humans to compile their future in terms of capacity, justice, power and interdependence, in more narrow sense, development could be seen just as the ability of the people to meet their basic needs, such as food, shelter, health and protection. Referring to Haughton and Hunter [4] cited in Kumurur [3] said that cities are areas concentrated with a group of people and their activities that have continuous improvement in natural, artificial and social environments from small scale to regional scale to support the fulfillment of the citizen’s needs. Therefore, the cities expand its space to fulfill the needs of the people. However, the expansion of urban space created more distances between the origin and destination of daily travel of the citizen, even though that situation does not restrict the possibility of the citizen to continue their mobility.

The mobility of the urban dwellers has diverse grooves and circulation patterns that are required...
in accommodating the displacement from one place to another, as part of the transportation system. Later, the system will not only control the use of urban land but also the patterns of urban mobility that is performed by the movement of goods and people in the city. The higher number of population, especially in the more wide area, will create the more complex patterns so the more routes are needed as the demand of city transportation system tends to increase as the expansion and sprawl phenomena. In fact, the phenomena of urban sprawl are directed by the growing population in the city center that increases property cost and also the cost of developing urban public service and infrastructure in the city center. Those situations lead to the high cost of living in the city center that encourage the development in the periphery areas to fulfill the needs of the growing urban population [5]. Therefore, the phenomena of urban sprawl create new centers of activities in peripheries that increase complexity and uncertainty of urban mobility [6,7]. These phenomena also expand the needs of transportation services into the peripheries. Integration in transportation services in the two regions should be established so the urban agglomeration is able to improve accessibility and quality of life to the new centers in the peripheries [8]. In this context, the growing challenges of urban mobility have pushed the city to innovate to find solutions that can improve spatial integration among city center and the new centers in the peripheries.

One of the efforts performed in many cities is the development of a special public transport system called as Bus Rapid Transit (BRT). This system offers various advantages as the name implies, namely Bus Rapid Transit. First is "Bus", the bus fee budget is lower compared to other transit transportation modes. Second is "Rapid", the higher speed provided because the path is separate from other vehicles so avoiding congestion. The third is "Transit", a flexible and scalable system so it is easy to manage changes and increase in route coverage to new development areas [9]. In order to make it effective, BRT system requires several elements, Diaz and Schneck [10] cited in Wirasinghe [11] divided BRT system into six elements, namely bus lines, transportation modes, stations or stops, tariff collection systems, operating supervision systems and passenger information systems. This paper will focus on the bus stops as one of the important elements of BRT system. As a growing metropolitan, Semarang has also provided a BRT-like transportation system, providing services in the city as well as to the peripheries in its urban agglomeration. In fact, the system could not be said as a BRT system yet, because it has no special bus lane yet that make the system could not guarantee the speed of the bus system as the system could not immune to traffic congestion yet. There are two BRT-like system in Semarang, i.e., the Trans Semarang that provide the services in the city of Semarang, and the Trans Jateng that provide the services that connecting the city center to the peripheries.

One of the Trans Jateng is the Semarang-Bawan line that provides the service through Ungaran to Bawan, the southern peripheries of Semarang. Ungaran-Bawan is a strategic area for regional economic growth [12] and Ungaran City is the part of The Centre of National Activities Kedungsepur (Kendal, Ungaran, Semarang, Salatiga, Purwodadi). While Ungaran City has a role to support Semarang Metropolitan City for settlement area needs and other urban activities in regional scale [13]. The research aims to assess the service quality of the Trans Jateng bus stops in the sub-urban corridor (Ungaran-Bawan) based on the user opinion and perception. There are 28 bus stops, consisting 16 bus stops towards Semarang and 12 bus stops leaving Semarang, in the corridor that are located along the regional road that connecting Semarang to Bawan, in four sub-districts of the Semarang Regency, i. e., Ungaran Barat, Ungaran Timur, Bergas and Bawan. Such analysis for the bus stops will provide significant input that are needed to improve the service quality of the BRT system as it is expected to be the main transportation system for the area in the future, through the improvement of the quality of one of the most important facilities of the bus system. The improvement of the bus stops services is expected could improve the BRT service, and could differentiate the bus system with other mode of transportation service [14], so the bus system could be improved as one of the efforts in shifting urban mobility from the private mode of transportation system based today into a more public transportation system based in the future of Semarang.

As there are varies condition of the bus stops today, this research categorized the 28 bus stops into
three groups: good, quite well, and bad categories. Table 1 shows the list of the bus stops in these three categories that are also differentiated according the route of the bus services leaving Semarang or towards Semarang. This paper is arranged into some parts. Following introduction, the paper provides the explanation on the methodology, including variables and data collecting method, used in this research. Subsequently, the paper provides the results and discussion that become the main part of this paper. This part is divided into some sections, according the theme of analysis in the research. Finally, the paper is finished by a conclusion in the end.

Table 1. Bus Stops Category Based on Author Assessment

| Category | Bus Stops in Semarang-Bawen Route | Bus Stops in Bawen-Semarang Route | Author Assessment Result |
|----------|-----------------------------------|-----------------------------------|--------------------------|
| Good     | 1. Taman Unyil                    | 1. Bergas 2                       | 1. Close to crossing facilities or area |
|          | 2. Mas Salamah                    | 2. SMA N 1 Bergas                | 2. Close to the activities centre, such as settlements, industries, offices, education centres, markets, and commercial activities |
|          | 3. SMA N 1 Ungaran 1             | 3. Sub Terminal                  | 3. Close and also in the transit area to other transportation modes |
|          | 4. Undaris 1                      | 4. Wujil 2                       | 4. Having supporting facilities |
|          | 5. Pasar Babadan                  | 5. Undaris 2                     | 5. There are lighting and trees around the bus stop |
|          | 6. Lemah Abang                    | 6. Mang Engking                  | 6. Having a clean condition |
|          | 7. Pasar Karang Jati              | 7. SMAN 1 Ungaran 2              | 7. Connecting with a pedestrian path |
|          | 8. Benteng 2                      |                                   |                          |
| Quite    | 1. Sido Muncul                    | 1. Kantor Kecamatan              | 1. Close to the activities centre, such as settlements, industries, offices, education centres, markets, and commercial activities. |
| Well     | 2. Bergas 1                       | 2. Harjosari 2                   | 2. Having supporting facilities |
|          | 3. Harjosari 1                    | 3. Ngobo                         | 3. There are lighting and trees around the bus stop |
| Bad      | 1. PT Mas                         | 1. Langensari 2                  | 4. Having a clean condition |
|          | 2. Pasar Bandarharjo              |                                   |                          |
|          | 3. Benteng 1                      |                                   |                          |
|          | 4. Langensari 1                   |                                   |                          |
|          | 5. Wujil 1                        |                                   |                          |
|          | 6. APAC Inti                      |                                   |                          |

Source: Author Analysis (2019)

2. Methodology
In order to assess the service quality of bus stops, this research uses three variables: location, physical appearance and service level that are measured by users’ opinion and perception on some measurement elements that are shown in Table 2. The data are collected by doing interviews directed by questionnaire to 140 passengers or users of the Trans Jateng in April to May 2019 at 09.00 AM – 06.00 PM. The interviews also asked suggestions and other users’ input that could be expected to provide more benefits for the development of bus system.

| Variable                  | Element                                                                 | Literature                                                                 |
|---------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Location                  | Relation with road activity                                              | American Public Transportation Association [15]                           |
|                           | Distance between other bus stops in one corridor                         | Department of Transportation [16]                                          |
|                           | Accessibility                                                            | Nugroho [17], Department of Transportation [16], Demetsky dan Lin [18] and Ellis [19] |
|                           | Service Group Target/Spatial Characteristics                             | Tamin [20]                                                                |
| Physic                    | Physical Dimension (length of bus stop, stop area for other vehicles and platform) | American Public Transportation Association [15] and Guideline for The Location and Design of Bus Stops -Report 19 [21] |
|                           | Shelter                                                                  | Guideline for The Location and Design of Bus Stops -Report 19 [21] and RPTA Bus Stop Program and Standards, Bus Stop Design Guidelines [22] |
|                           | Passenger Seating Area                                                   | Guideline for The Location and Design of Bus Stops -Report 19 [21]        |
|                           | Trash Can                                                                | RPTA Bus Stop Program and Standards, Bus Stop Design Guidelines [22]      |
|                           | Pedestrian Path                                                          | determined by using two analysis techniques. The first is descriptive statistics analysis to get the result of user assessment of the bus stop, additional bus stop elements, user and travel characteristics. This technique uses the 5-points Likert scale rating, for measuring the user assessment consist of very good, good, quite well, not good and bad, meanwhile for additional element consist of strongly needed, needed, abstain, low important needed and absolutely not needed. The second technique is cross-tabulation analysis to get valuation relationship between service level with physical element and location variables. As for, study applies Accidental Sample for determining the

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Table 2. Variables Used in The Assessment of Bus Stop

The analysis is performed by using two analysis techniques. The first is descriptive statistics analysis to get the result of user assessment of the bus stop, additional bus stop elements, user and travel characteristics. This technique uses the 5-points Likert scale rating, for measuring the user assessment consist of very good, good, quite well, not good and bad, meanwhile for additional element consist of strongly needed, needed, abstain, low important needed and absolutely not needed. The second technique is cross-tabulation analysis to get valuation relationship between service level with physical element and location variables. As for, study applies Accidental Sample for determining the
questionnaire respondents and Lemeshow Formula to decide the number of respondents per bus stop. As the result, there are 5 respondents in every bus stop that who will be research subject.

3. Result and Discussion

3.1. The Characteristics of User and The Travel

3.1.1. The Characteristic of User.

Users' opinion and perception are the objects for the assessment of the quality level of the bus stops. Characteristics of the users are varies as they have various social, and economic backgrounds. The study tried to identify their characteristics through five variables: gender, age, personal vehicle ownership, daily transportation expenses and frequency of BRT use. The majority of the users are women that reached 60% of the users. In the age group, the domination (the highest proportion, 27%) is the aged 18-24 years old, and majority (59%) of the users have their own motorbikes, and 70%, users spend less than IDR 20,000.00 for daily transportation cost. Finally, the frequency of users using BRT reflects that the majority of users use BRT since only 3% who are rarely use BRT.

3.1.2. Travel Characteristic.

According to the survey, travel characteristics of the bus system’s users also vary as they have different purpose, motivation, origin, destination, etc. There are some description of the travel characteristics as follows:

- The Origin and Destination
  Most of the travels of the users of the bus system are home-based and workplace-based travel. The survey shows 50 respondents do their travel from home and 88 respondents use the bus system to go home. Subsequently, 48 respondents said that their origins were their workplace and 18 respondents mention that they will use the bus system to go to their workplace.

- Motivation and Assessment of the Trans Jateng BRT Ungaran-Bawen Corridor Service
  The motivation to ride the bus system consists of seven basic reasons, cheap fare, convenient, close to the origin and destination, fast or no longer time to wait, arrive quickly, never used the Trans Jateng bus system and others. The result shows that the highest motivation was cheap fare as it was said by 56 respondents, then followed by convenience (obtaining 33 respondents), and fast (17 respondents).

- The Area of Origin and Destination
  The areas of origin and destination are categorized into two groups: the city centre (Semarang City) and the peripheries (Sub-district of Ungaran, Bergas, Bawen, and others). The results show the area of origin of the Ungaran-Bawen (leaving Semarang) Route was dominated by Semarang City while Ungaran area was the main area for the destination. Meanwhile, in the Bawen-Ungaran (towards Semarang) Route, Bergas Sub-District was majority area of origin, and Semarang City was the main destination area. These results show that the bus system was utilized as the centre-peripheries centre public transportation system.

- The Relation of Distance between the bus stops with Origin and Destination with the Transportation Mode
  Most respondents said that the distance between bus stops to their origin and/or destination are more than 600 meters, a distance that is started to be not convenience on foot in the area including Semarang that has a high humidity as well as its southern peripheries that are hilly areas. These conditions have made most of respondents need to use another mode of transportation to reach the bus stops from their origin as well as to reach their destination from the bus stops. The dominant other mode of transportation used by the respondent was private motorbike and/or other public transportation. These phenomena indicate that the bus system still needs integrated feeder support to improve its services.

- The Relation between Origin and Destination with The Travel Area
  The survey shows that the Ungaran-Bawen (leaving Semarang) Route was dominated by workplaces from Semarang City as the origin of the travels with the main destination to
Ungaran, settlement area that also become the main service centre for the southern peripheries of Metropolitan Semarang. However, there are also some travels that heading to Bawen with other city like Solo, Salatiga, Madiun, Jogya, Ambarawa and Temanggung are the destination areas, as Bawen has also a regional terminal in the south of Semarang that connect Semarang to other cities in the south. Meanwhile the Bawen-Ungaran (towards Semarang) route was dominated by residences from Bergas District who is going to Semarang City as the dominant destination, who are going to the workplace as well as other activities as Semarang City has various activities because it is the destination of a settlement, workplace, school/college, siblings and others. However, there are also some respondents who have other cities like Ambarawa, Salatiga as their place of origin. This information shows that the Trans Jateng bus system is not only serve as home-based as well as workplace-based travel that we can said as internal travels of Semarang Urban Agglomeration / Metropolitan Area, but also serve to the “external travels” that link Semarang to other towns and cities in the surroundings.

3.2. The User Assessment of Bus Stops

3.2.1 The User Assessment on Location Issues on The Bus Stops

The overall score of the location variable is quite well because it has a value of 3.29. Table 3 shows the results of the assessments of each element: related to the target of group service worth 3.63 (tend to be good), related to road activities worth 3.28 (quite well), related to the distance between bus stops in one route worth 3.18 (quite well) and related with accessibility worth 3.06 (quite well). The results show that there is an asynchronous result between author’s classifications on the bus stops with user assessment in the distance between bus stops in one route. Group 1 (God Bus Stops) shows a smaller value, compared to group 2 (Quite Well Bus Stops) that gets a higher value. This asynchronous occurs because the author’s classification of the bus stops is not based on the distance between stops in one route and the accessibility.

Table 3. The User Assessment of Location Issues

| Variable                          | Elements                              | Group 1* | Group 2* | Group 3* | Total Score |
|-----------------------------------|---------------------------------------|----------|----------|----------|-------------|
| Location                          | Related to Target of Group Service    | 3.93     | 3.57     | 3.40     | 3.63        |
|                                   | Related to Road Activities            | 3.42     | 3.32     | 3.09     | 3.28        |
|                                   | Related to The Bus Stop Distance in   | 3.22     | 3.50     | 2.83     | 3.18        |
|                                   | One Route                             |          |          |          |             |
|                                   | Related to Accessibility              | 3.33     | 3.01     | 2.83     | 3.06        |
| **Total Score**                   |                                       | 3.48     | 3.35     | 3.04     | **3.29**    |

*Bus Stops Category based on Author Assessment, Group 1: Good, Group 2: Quite Well, Group 3: Bad
Source: Author Analysis (2019)

3.2.2 The User Assessment on Physical Issues on The Bus Stops

The assessments of physical elements are divided into 6 elements: physical dimensions, sitting area, trash can availability, information board of instructions, symbols, routes and schedules, pedestrian paths and parking areas. Table 4 shows the total value of physical variable that gets 2.52 so it is categorized below quite well that indicates that there are some issues that are need to be improved, i.e., in the availability of trash can, information board, parking or dropping point, and pedestrian path/facilities. However, there are two asynchronous results. First is in the pedestrian way element as the value of Group 2 is lower than that of the Group 3. Second, in the parking area that Group 1 is lower than Group 2. These are happened because the variables and elements used by author’s classification were different too those of the user’s assessments.

Table 4. The User Assessment of Physic Issues
### Variable

| Elements                                      | Group 1* | Group 2* | Group 3* | Total Score |
|----------------------------------------------|----------|----------|----------|-------------|
| **Physic**                                   |          |          |          |             |
| Physic Dimension                             | 3.46     | 3.17     | 2.84     | 3.16        |
| Sitting Area                                 | 3.29     | 3.23     | 2.47     | 3.00        |
| Trash Can                                    | 1.90     | 1.78     | 1.53     | 1.74        |
| Information Board of Instructions, Symbols, Routes and Schedules | 3.23     | 2.83     | 1.00     | 2.35        |
| Pedestrian Path                              | 2.79     | 2.05     | 2.54     | 2.46        |
| Parking Area                                 | 2.37     | 2.73     | 2.23     | 2.44        |
| **Total Score**                              | 2.84     | 2.63     | 2.10     | **2.52**    |

*Bus Stops Category based on Author Assessment, Group 1: Good, Group 2: Quite Well, Group 3: Bad

Source: Author Analysis (2019)

#### 3.2.3 The User Assessment on Service Level on The Bus Stops

The assessment of service level is measured through 10 elements that could be seen in Table 5. The total score obtained a score of 3.01 which means the user still rated it quite well. However, there are some issues in some elements in the service level. Overall, the bus stops are not convenient yet, according to the users. The need some improvement also in passenger sitting area. Partially, there are many issues in Group 3 (the not good bus stops), some issues in Group 2 (quite well bus stops) and one issue in Group 1 (the good bus stops). The Group 1 and Group 2 still have some issues in passenger sitting area, and they are still not convenience yet. Meanwhile, issues in Group 3 are safety and security, not-convenient, aesthetical issue, passenger sitting area, visibility, passenger waiting area, passenger movement flow, and cleanliness. Moreover, Table 5 also indicates the asynchronous between group 1 and group 2 ratings on the passenger waiting room element, aesthetics, and bus stop level cleanliness because the value in group 1 are lower than those of Group 2.

#### Table 5. The User Assessment of Level of Service Issues

| Variable          | Elements                      | Group 1* | Group 2* | Group 3* | Total Score |
|-------------------|--------------------------------|----------|----------|----------|-------------|
| **Level of Service** | Passenger Waiting Area     | 3.16     | 3.57     | 2.66     | 3.13        |
|                   | Passenger Sitting Area       | 2.64     | 2.50     | 2.29     | 2.48        |
|                   | Passenger Movement Flow      | 3.40     | 3.40     | 2.94     | 3.25        |
|                   | Pedestrian Movement Flow     | 3.84     | 3.40     | 3.31     | 3.52        |
|                   | Vehicle Movement Flow        | 3.48     | 3.46     | 3.18     | 3.37        |
|                   | Safety and Security          | 3.25     | 3.23     | 1.20     | 2.56        |
|                   | Visibility                   | 3.89     | 3.87     | 2.37     | 3.38        |
|                   | Convenience                  | 2.29     | 1.97     | 1.71     | 1.99        |
|                   | Aesthetics                   | 3.41     | 3.50     | 2.24     | 3.05        |
|                   | Cleanliness                  | 3.64     | 3.73     | 2.89     | 3.42        |
| **Total Score**   |                                | 3.30     | 3.26     | 2.48     | **3.01**    |

*Bus Stops Category based on Author Assessment, Group 1: Good, Group 2: Quite Well, Group 3: Bad

Source: Author Analysis (2019)

#### 3.3. The Assessment Analysis of Additional Bus Stop Element Needs

#### 3.3.1 The Additional Bus Stop Element Needs on Location Variable
The additional elements needed in location variables are seen in Table 6 which shows the division based on the elements in two forms of questions, namely the stop space of other modes of transportation and crossing facilities. The table shows the assessment in which results have been sorted according to the level of need. The crossing facilities occupy the first position because the value is higher, at 3.37, compared to the need for stop space for other transportation modes which only get a value of 2.70. The table also shows the user chooses not to answer in all groups at the crossing facility. However, based on the real conditions, there are still some bus stops in group 1 is still really need crossing facilities, such as Unyil Park, Mas Salamah, Lemah Abang, Bergas 2, Wujil 2, Mang Engking and Benteng 2 and all group 2 and group 1. And the crossing facilities should be located at a maximum of 100 meters from the bus stop. Other results show that the stopping space for other transportation modes only gets a value of 2.70 so the user tends not to answer. Although, the bus stops in group 1 still needed, for example, SMA N 1 Ungaran 1, Undaris 1, SMAN N 1 Bergas, Wujil 2, Undaris 2, Mang Engking and SMA N 1 Ungaran 2.

Table 6. The Additional Bus Stop Element Needs on Location Variable

| Variable               | Questions                                      | Group 1* | Group 2* | Group 3* | Total Score |
|------------------------|------------------------------------------------|----------|----------|----------|-------------|
| Location               | The need of a stopping area to other transportation mode (a more integrated facility) | 3.03     | 2.43     | 2.63     | 2.70        |
|                        | The need of a crossing facility                | 3.21     | 3.43     | 3.46     | 3.37        |

*Bus Stops Category based on Author Assessment, Group 1: Good, Group 2: Quite Well, Group 3: Bad
Source: Author Analysis (2019)

3.3.2 The Additional Bus Stop Element Needs on Physics Variable

The additional elements to the physical variables are described in Table 7. The table shows the several additional elements needed which are the bus travel schedules and disability facilities while the tends to be needed are obtained by the bus travel routes. This is by the real situation because all bus stops do not have bus travel information and the disabled facilities yet. However, based on the real condition there are still many requiring additional elements to show their functions. First, the garbage bin that almost all bus stops need it, except Karang Jati Sub-Terminal, Undaris 2, Mang Engking, SMA N 1 Ungaran 2, Benteng 2, Taman Unyil, PT. Mas, As Salamah, Bandarharjo Market, SMA N 1 Ungaran 1, Undaris 1, Pasar Babadan, Lemah Abang, Sido Muncul and Bergas 1. Second, pedestrian ways were all bus stops in group 2 tend to require these facilities. The existing pedestrian ways do not accommodate disabilities people, sidewalks do not have a minimum width of three feet and not all sidewalks are equipped with ramps at each intersection. Third, the payment corner before entering the vehicle, based on the conditions, all bus stops do not have the facility yet. Fourth, the parking area for vehicles that do not stop for long which in all groups of shelters indicates that respondents tend not to answer. Fifth, the shelter door with respondents chose not to answer even though based on the conditions some bus stops needed, such as PT. Mas, Bandarharjo Market, Benteng 1, Langensari 1, Wujil 1, APAC INTI and Langesari 2. Sixth, the parking area for a long time by showing the results of users say less needed. Last, the shelter nameplate as a whole said tend to be less needed even though some bus stops do not have one, such as Langensari 1, Wujil 1, APAC INTI and Langensari 2.

Table 7. The Additional Bus Stop Element Needs on Physic Variable

| Variable | Questions                                      | Group 1* | Group 2* | Group 3* | Total Score |
|----------|------------------------------------------------|----------|----------|----------|-------------|

8
The need of door shelters 2.84 2.50 3.14 2.83
The need of a name board 1.16 1.13 2.6 1.63
The need of payment point before entering the bus 3.16 2.93 2.8 2.96
The need of disability facilities 4.33 4.6 4.29 4.41
The need of trash cans 3.13 3.13 3.6 3.29
The need of bus route formation board 4.00 3.57 4.37 3.98
The need of schedules information board 4.44 4.43 4.51 4.46
The need of better pedestrian path to the bus stop 2.63 3.83 3.2 3.22
The need of dropping zone 2.72 2.53 2.91 2.72
The need of parking area 2.48 2.57 2.09 2.38

*Bus Stops Category based on Author Assessment, Group 1: Good, Group 2: Quite Well, Group 3: Bad
Source: Author Analysis (2019)

3.3.3 The Additional Bus Stop Element Needs on Service Level Variable

The results show that the first was obtained by security facilities, such as CCTV and emergency buttons because it got a total value of 4.06 with priority needed by bus stops in groups 1 and group 2 with values of 4.29 and 4.07. While the bus stops in group 3 only get a value of 3.83 so it tends to be needed. Although in the conditions, all bus stops do not have good security facilities yet so it is important to provide in increasing passenger safety. The second element is the improvement of bus stop designs that obtain tends to be needed, like PT.Mas and Pasar Bandarharjo which have broken and damaged shelter walls, Wujil 1 which is in very poor condition due to the absence of a good protective wall or supporting facilities and also for Benteng 1, Langersari 1, APAC INTI and Langesari 2 because they are only a shadow shelter whose physical design is not fixed. Another case with the plant element to increase comfort, where the bus stops in group 1 tends to needed, group 2 needed and group 3 valued respondents do not answer. Despite the fact, most of the plants are already around the bus stop but do not belong to the bus stop itself. The final element is the lighting for safety that has an overall rating of 3.56 so it tends to be needed. However, the bus stops in group 3 show a value of 4.23 so users say they need it. Proven based on the conditions, all the bus stops in group 3 have not been equipped with lighting because they are still dependent on street lighting.

Table 8. The Additional Bus Stop Element Needs on Service Level Variable

| Variable     | Questions                        | Group 1* | Group 2* | Group 3* | Total Score |
|--------------|----------------------------------|----------|----------|----------|-------------|
| Physic       | The need of security facilities, such as CCTV and Emergency Button | 4.29     | 4.07     | 3.83     | 4.06        |
|              | The need of plants to increase convenience | 3.85     | 4.03     | 3.34     | 3.74        |
|              | The need of physical design improvement | 3.61     | 3.67     | 4.29     | 3.86        |
|              | The need of better lighting facility to increase security | 3.09     | 3.37     | 4.23     | 3.56        |

*Bus Stops Category based on Author Assessment, Group 1: Good, Group 2: Quite Well, Group 3: Bad
Source: Author Analysis (2019).

3.4. The Relation Between Service Level Variables with Location and Physic Variables on Bus Stops

The bus stop assessment result could show the relationship between service level with location and physical variables. Both relationships indicate that location and physical variables are independent variables while service level variables are dependent variables. The service level variable is called the
dependent variable because the results depend on the results of location and physical variables. Correlations are created if the results which are using the SPPS Application show the Chi-Square Calculation > Chi-Square Tables and Asymp values. Sig <0.05. Not only that, the elements whose results are correlated are based on SPPS Application calculations and will be tested again by the relation direction through the diagram. Diagrams will produce a positive or negative direction to give a picture of the relationship that occurs by the assumptions or logic thought. However, not all elements correlate, only a few elements that show the relationship and the correlation between variables is seen in Tables 9.

### Table 9. The Cross-Tabulation Result for Analysis of Physical Variables and Location Variables with Service Level Variables

| Location | Physic | Service | Chi-Square Calculation | Chi-Square Table | df | \( \lambda \) |
|----------|--------|---------|------------------------|------------------|----|---------|
| The Condition between bus stop’ location with road conditions | The Movement for One Bus in The Stopping Area | 1,02432 | 26,30 | 16 | 0,000 |
| | The Condition of Bus Movements with Road Conditions | 54,285 | 26,30 | 16 | 0,000 |
| Pedestrian Path Condition | The Pedestrian Movement | 39,838 | 31,41 | 20 | 0,05 |
| Seating facilities condition | The Adequacy of The Passenger Sitting Room | 26,707 | 26,30 | 16 | 0,026 |

Source: Author Analysis (2019)

3.4.1 The Relation Between Location Variables with Service Level Variables

The author assumes there are two relation in these both variables. First, the relation between the assessment of movement for one bus in the stopping area and the assessment of bus movements with road conditions with the relation of the bus stop’ location with road conditions. Both are assumed, if the bus flow in the stopping area is better, the bus stop’ location will not be disrupted to the road condition, as well as the question regarding the flow of bus to the road condition. The results of cross-tabulation on the two correlations produced perfect results because both of them obtained 0,000 values in the Asymp. Sig. Table 9 shows the results of cross-tabulation between the movement activities for one bus in the space where the bus stops with the location of the bus stop and the road condition. Also shows the correlation between the bus movements to the road condition with the bus stop’ location to the road condition. In conclusion, the better of the relation of the bus stop’ location between road activities, the better of service level of bus stops in the vehicle flow on the stopping area and the relation of the bus movement with road activities, vice versa.

3.4.2 The Relation of Physics Variables with Service Level Variables

The physical elements of the bus stop effect the service level to the user. The relation between them could be seen in the correlation in the two elements, the relationship between the pedestrian path condition and the pedestrian movement also the relationship between the seating facilities condition and the adequacy of the passenger sitting room. Both produce Chi-Square values Calculate > Chi-Square Table and Asymp value. Sig <0.05 which is clearly seen in table 9. This proves that the better of the condition assessment of the pedestrian path and the trash can facilities, the better the pedestrian movements assessment and the adequacy of the sitting room. In other words, the better of physical
elements such as the pedestrian path and bus stop facilities, the better of the pedestrian movement and the more adequate sitting room for passenger.

4. Conclusion
The development of Trans Jateng will never be separated from the importance of a bus stop. However, the problem of the existence of bus stops is often ignored by the service level because of various problems, especially bus stops in Sub-Urban Areas such as Ungaran Barat District and Ungaran Timur Sub-District, Bergas Sub-District and Bawen Sub-District, Central Java Province. Therefore, this study aims to determine user assessment for the service level of the Trans Jateng’s bus stops based on location, physical and service level variables.

Table 10. The Total User Assessment for Bus Stop’s Service Level

| Variable          | Group 1* | Group 2* | Group 3* | Total Score |
|-------------------|----------|----------|----------|-------------|
| Location          | 3.48     | 3.35     | 3.04     | 3.29        |
| Physic            | 2.84     | 2.63     | 2.10     | 2.52        |
| Service Level     | 3.30     | 3.26     | 2.48     | 3.01        |
| Total             | 3.21     | 3.08     | 2.54     | 2.94        |

*Bus Stops Category based on Author Assessment, Group 1: Good, Group 2: Quite Well, Group 3: Bad
Source: Author Analysis (2019)

The study shows that, in aggregate, the users’ assessments indicate that the quality of service of Trans Jateng Bus Stops in the Ungaran-Bawen Corridor was still quite low as the total score was only 2.95. It was because the physical aspect or variables that are still got lower point in the user assessment. This indicates that significant improvements are needed in the Tans Jateng Bus Stops, especially in the physical aspects, even though also in the location and service level variables as they have not maximum value yet in this user assessments. The more prioritize improvements are needed for the not-good bus stops category, as they have the lowest points in the assessment. If this category has better results, this will increase the users’ assessment significantly and hopefully will also improve the quality of service of the Trans Jateng bus system that is effectively linking the urban core in the City of Semarang to its southern peripheries in the metropolitan area vice versa.

The improvements of the bus stops could be considered more significant as the users of the bus service are tend to be women in the productive age who are doing the travel for working travel, as home-based and workplace-based travel were found as the majority type of traveling in the users’ travel by the bus system. The provision of integrated feeders to the bus system could be an important consideration too in the improvements of the provision of the bus system, as it is indicated in the survey that the bus stops’ location are quite far from the origin as well as the destination place of the users so the users need to use other mode of transportation to reach the bus stop from their origin and also to reach their destination from their destination bus stop.

5. Acknowledgment
This article was presented at the 2nd International Conference on Smart City INNOVATION (ICSCI) 2019, jointly held by Universitas Indonesia and Universitas Diponegoro. ICSCI conferences have been supported by the United States Agency for International Development (USAID) through the Sustainable Higher Education Research Alliance (SHERA) Project for Universitas Indonesia’s Scientific Modelling, Application, Research, and Training for City-centered Innovation and Technology (SMART CITY) Center for Collaborative Research, administered through Grant #AID-497-A-1600004, Sub Grant #IIE-00000078-UI-1.
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