Review on Operational Performance of Employee Shuttle Service in Industrial Areas of Jababeka-1 Cikarang, West Java

Achmad Wicaksono 1,*, Panji Pasa Pratama1, Harnen Sulistio1, and Rahayu Kusumaningrum1

1 Department of Civil Engineering, Faculty of Engineering, Universitas Brawijaya, Indonesia

Abstract. Bekasi has one of the biggest industrial areas in Indonesia called Industrial Area of Jababeka 1 Cikarang, which has provided facility of employee “shuttle” transport for the employees. However, the employee shuttle service has not been able to accommodate all employees in the industrial areas especially in Industrial Area of Jababeka 1 Cikarang. This study aims to investigate the existing condition of operational performance of employee shuttle service, knowing the satisfaction and the necessity level of the service based on users’ perception, and provides recommendation for the improvement of employee shuttle service in the Industrial Area of Jababeka 1 Cikarang. This study uses Importance Performance Analysis (IPA) method and multiple linear regression models. The final regression model is \[ Y = 2.034 + 1.621X_2 + 1.039X_4 + 1.311X_5 + 0.829X_6 + 1.046X_7 + 1.877X_8 + 1.619X_{10} \]. This result shows that there are 3 variables which influence the performance of employee shuttle service (R^2 = 0.934) including X_8 variable (Sanitary Facility/Dust Bin) and X_2 variable (Vehicle Driving Skills), and X_{10} variable (Age of the Vehicle).

1 Introduction

Industrial areas in Indonesia are spread out almost in all regions and islands in this country. Those industrial areas generally have a large land, many of company and employees, production, and flow of goods (either export or domestic). Bekasi is one of regencies in West Java Province where the capital city is in Cikarang. Economy in Bekasi is sustained by agriculture, trade, and industry. Nowadays, there are a lot of industries in Bekasi which include seven biggest industrial areas located in Cikarang. Those industrial areas are Jababeka, MM 2100, Delta Mas, Lippo Cikarang, Hyundai, EJIP, and Bekasi Fajar.

Industrial area of Jababeka is the biggest industrial area in Bekasi especially in Cikarang with an area of approximately 1,570 hectares in which there are more than 1,500 local and multinational companies. The growth of industrial area in Bekasi has made on the increase of the employment and the number of employees, either originally from Bekasi or come from outside of Bekasi. The existing industrial area of Jababeka 1 Cikarang, which is the
biggest industrial area, also shows that there is an increased number of employees. This will result in an increase of trips in Bekasi which directly impacts on the transportation activity in this area. Although there is a public transport terminal as the main entrance to the industrial areas of Jababeka 1 Cikarang, but the public transport in this terminal does not giving a service to all regions in industrial area of Jababeka 1 Cikarang, because it passes only on one road. Therefore, the existing public transport does not serve the employees who need transportation to reach their destination.

In reality, the employee shuttle service has not been able to accommodate all employees in the industrial area of Jababeka 1 Cikarang. There are still a lot of employees who use private vehicles such as car or motorbike. Based on that problem, a further study is needed to investigate the operational performance of the existing employee shuttle service in order to reach all the industrial area of Jababeka 1 Cikarang.

This study has several objectives as: (i) To evaluate the existing operational performance of employee shuttle service in the industrial area of Jababeka 1 Cikarang, (ii) To determine the satisfaction and importance level of some employee shuttle service characteristics according to user’s perception using Important Performance Analysis (IPA) method, and (iii) To give some recommendations in order to improve the employee shuttle service in the industrial area of Jababeka 1 Cikarang based on the result of multiple linear regression analysis.

2 Literature review

Employee shuttle service is a transport service for people whose an employee and utilizing car for public passengers or bus [1]. This special mode of transport is a transport mode which has its origin and/or destination to serve public passengers commuter, especially employees commuter. Employee shuttle service is implemented in such a way which serves from and to workplace with several passenger pick-up points, that scheduled, should not be stopped at the terminal, using yellow license plate car, with direct or indirect payments. There are several previous studies on this employee shuttle service, these are:

i) Satisfaction Level of Public Transport Users in DIY [2]. The paper shows that the public transport service in Yogyakarta is generally bad as it is indicated by low level of the compliance. Factors that influence the satisfaction level are safety, security, and comfort.

ii) Prospect of Employee Shuttle Service - A case study in Government Office of Central Java Province [3]. The result shows that the use and development of employee shuttle service for government employee of Central Java Province are influenced by the level of income, education class, family size, vehicle ownership, and travel time.

iii) Modeling on Guided Busway Needs Using Structural Equation Modeling [4]. The journal shows that travel origin and destination, travel patterns, willingness to pay and ability to pay have positive and significant impact on the Guided Busway Needs.

iv) Influencing Factors of School Bus Service Quality [5]. The analysis shows that there are 4 variables that has to be improved, these are: facilities, infrastructures, teachers, and employees.

v) Preliminary Study of School Bus Operation (Case Study: Bus Halokes Malang) [6]. The paper shows that the operational performance of the school bus is good enough. Based on the user's perception there are three important variables that should be improved i.e: comfort, safety and reliability.
3 Methods

3.1 Data collection

There are several methods of data collection that used in this study:

i) Inventory Survey on Transport Infrastructures
   To determine the transport infrastructures in the industrial area of Jababeka 1 Cikarang

ii) Static Survey of Employee shuttle service
    To determine the number of employee shuttle service operated in the industrial area of Jababeka 1 Cikarang

iii) Important Performance Analysis (IPA) Method Questionnaire
     To determine the users’ perception toward the performance of the employee shuttle service in the industrial area of Jababeka 1 Cikarang

3.2 Sampling

Based on the calculation result by using Slovin formula for determining the number of samples, there is a need of 400 respondents for IPA method questionnaire survey.

3.3 Analysis method

Analysis method used in this study was:

i) Descriptive Analysis on Operational Performance of Employee shuttle service
   To determine the operational performance of employee shuttle service in the industrial area of Jababeka 1 Cikarang

ii) Important Performance Analysis (IPA) Method
    To determine the users’ perception toward the employee shuttle service in industrial area of Jababeka 1 Cikarang in which the result was plotted in a Cartesian diagram.

iii) Multiple Linear Regression Analysis
    To obtain a multiple linear regression equation to understand the relation of each variables in affecting the employee shuttle service performance.

4 Finding and discussion

4.1 Existing condition on operational performance of employee shuttle service in industrial area of Jababeka 1 Cikarang

Based on the data obtained from Customer Service Division of PT. Jababeka Tbk, there were 844 companies and 249,925 employees in the industrial area of Jababeka 1 Cikarang. There are 88 employee shuttle services which passing through Gate 1, 19 employee shuttle services passing through Gate 7, and 13 employees shuttle services passing through Gate 9. Therefore, the total number of employee shuttle services operated in industrial area of Jababeka 1 Cikarang is 120 vehicles. There are nine routes of employee shuttle service servicing in the industrial area of Jababeka 1 Cikarang. Three routes through arterial streets including Route D (Cibarusah Destination), Route E (Cibitung, Tambun, Bekasi Timur destination), and Route H (Kerawang Destination-By Pass). Besides the three routes, some employee shuttle services are operated through tollroads.
Table 1. Data of Bus company operated in Cikarang-1 Industrial Area

| No | Bus Company   | Fleets |          |          | Total vehicles each company |
|----|---------------|--------|----------|----------|-----------------------------|
|    |               | Gate 9 | Gate 1   | Gate 7   |                             |
| 1  | Aneka Jaya    | 0      | 0        | 1        | 1                           |
| 2  | Bina Transport| 1      | 2        | 0        | 3                           |
| 3  | Hiba Utama    | 1      | 24       | 1        | 26                          |
| 4  | GMS           | 1      | 2        | 0        | 3                           |
| 5  | JM            | 0      | 0        | 1        | 1                           |
| 6  | Parahyangan   | 4      | 20       | 7        | 31                          |
| 7  | Putra Regu    | 0      | 2        | 0        | 2                           |
| 8  | Restu         | 0      | 4        | 0        | 4                           |
| 9  | SLJU          | 6      | 34       | 9        | 49                          |
|    | Total Each Door| 13     | 88       | 19       |                             |

Total 120 120

4.2 The result of importance performance analysis (IPA) methods

Based on the questionnaires which have been analyzed, it is obtained that the score of the average rate of importance is 3.44 and performance level is 3.02. The Cartesian diagram is obtained from the scores and the data from questionnaire using IPA method with the number of respondents of around 400. This diagram consists of four quadrants including quadrant I (main priority), quadrant II (keep achievement), quadrant III (redundant), and quadrant IV (low priority) which abscissa and ordinate lines that form the quadrant derived from the average value of the item aspect and level of performance (X) and the level of interest (Y). Cartesian quadrant position indicator is shown on Fig. 1. The indicators of each quadrant are described in Table 2.

Table 2. The indicator of quadrant

1 Quadrant I main priority (high importances but low performance)
   This indicator consists of 10 items: (1) item 4 - use of a window film glass of vehicle, (2) item 7 - driver’s driving skills, (3) item 11 - safety equipment such as fire extinguisher, glass breaker, and a flashlight, (4) item 12 - aspect of emergency health facility such as first aid kit, (5) item 13 - information emergency response with the availability of sticker shows contact to complaints and emergency situation, (6) item 19 - passenger’s seat belt, (7) item 24 - facility to regulate air room temperature/AC, (8) item 25 - hygiene facility in the form of dust-bin, (9) item 26 - smoking ban stickers, and the last (10) item 31 - age of vehicle.

2 Quadrant II, maintain achievement (high importance and high performance)
   This indicator consists of 3 items: (1) item 2 - the identity of the vehicle users, (2) item 29 - time between vehicles (headway) and (3) item 30 – total number of fleet in operation.

3 Quadrant III, excessive (high performance but low importance)
   This indicator consists of 9 items: (1) item 5 - emergency/dangerous lights signs and the position of that light shall be on top of vehicle, (2) item 8 - attitude and behavior of the driver, who must obey the rule and friendly, (3) item 9 - physical condition of the driver, (4) item 10 - working time of the driver, (5) item 14 -
facility of handrail for standing passengers, (6) item 15 - embarking and disembarking facility for passenger, (7) item 16 - the vehicle’s tire, (8) item 20 - disembarking passenger’s signs, and (9) item 21 - electricity for audio visual facility.

4 

| Quadrant IV low priority (low importance and low performance) |
|---------------------------------------------------------------|
| This indicator consists of 9 items: (1) item 1 - identity of the vehicle; (2) item 3 - vehicle interior lighting; (3) item 6 - knowledge of the driver; (4) item 17 – availability of rail curtain on window; (5) item 18 - speed limiter instrument; (6) item 22 - Depo and maintenance of the vehicle (pool); (7) item 23 - vehicle’s horsepower; (8) item 27 - information transport services and (9) item 28 - bus stop sign at the bus stop. |

Fig. 1. Cartesian diagram of IPA.

4.3 Regression Analysis

According to the analysis of Importance Performance Analysis (IPA) method there are 10 variables included to the quadrant I but once the researcher obtain the data from the analysis of correlation between variables there are only seven variables that will be used in multiple linear regression analysis, these are: (i) Driver’s Driving Skills (X2), (ii) First Aid Kit (X4), (iii) Emergency Response Information (Sticker Complaints Emergency) (X5), (iv) Seat Belt (X6), (v) Air Room Temperature Facility (AC) (X7), (vi) Hygene facility (Dust-Bin), and (Vii) Age of Vehicles (X10)

Based on the results of multiple linear regression analysis which had been done with the help of statistical program, it then obtained multiple linear regression equation with $R^2$ value is 0.934. So it can be expressed mathematically in the following equation:

$$Y = 2.034 + 1.621X_2 + 1.039X_4 + 1.311X_5 + 0.829X_6 + 1.046X_7 + 1.877X_8 + 1.619X_{10}$$ (1)
where:
\[ Y = \text{Performance of Employee shuttle service} \]
\[ X_2 = \text{Driver’s Driving Skill} \]
\[ X_4 = \text{First Aid Kit} \]
\[ X_5 = \text{Emergency Response Information (Sticker Complaints Emergency)} \]
\[ X_6 = \text{Seat Belt} \]
\[ X_7 = \text{Air Room Temperature Facility (AC)} \]
\[ X_8 = \text{Hygiene facility (Dust-Bin)} \]
\[ X_{10} = \text{Age of Vehicle} \]

From the equation above it can be concluded that there are three things that mostly influence the employee shuttle service based on the value of the coefficient, these are variable \( X_8 \) (Hygiene Facility (Dust-Bin)), variable \( X_2 \) (Driver’s Driving Skill), and variable \( X_{10} \) (Vehicles’ Age).

5 Conclusions and suggestion

5.1 Conclusion

Based on the result of analysis and discussion, it can be concluded as follows:

i) Existing Condition on operational performance of employee shuttle services are as follows:
   a. The employee shuttle service operate in the industrial area of Jababeka 1 Cikarang were giving a service to some routine commuters. The total number of employee shuttle service which operated in the industrial area of Jababeka 1 Cikarang was 120 fleets which only serve 14 industrial companies.
   b. There are nine routes of employee shuttle service which operated in the industrial area of Jababeka 1 Cikarang. There were three routes through arterial streets including Route D (Cibarusah Destination), Route E (Cibitung, Tambun, Bekasi Timur destination), and Route H (Kerawang Destination-By Pass). Besides the three routes, some employee shuttle services are operated through toll roads.

ii) Based on IPA Analysis, there are 10 variables in Quadrant I as the main priority (high importance but low performance). It consist of 10 items including (1) item 4-sunglass windows film, (2) item 7 – Driver’s driving skills, (3) item 11- safety equipment such as fire extinguisher, glass breaker, and a flashlight, (4) item 12 - health facility such as first aid kit, (5) item 13 - emergency response information in the form of complaints emergency sticker, (6) item 19 - seat belt, (7) item 24 – air room temperature facility -AC, (8) item 25 - hygiene facility (dust-bin), (9) item 26 - smoking ban stickers and the last (10) item 31 - age of vehicle.

iii) Based on the regression analysis of 10 variables handling priority. There are only seven variables that influence the employee shuttle service including Driver’s Driving Skill \( (X_2) \), Health Facilities/First Aid Kit \( (X_4) \), Emergency Response Information/ Sticker Complaints Emergency \( (X_5) \), Seat Belt \( (X_6) \), Air Room Temperature Facilities (AC) \( (X_7) \), Hygiene Facility/Dust-Bin \( (X_8) \) , and Age of Vehicle \( (X_{10}) \) with a multiple linear regression equation:
\[ Y = 2.034 + 1.621X_2 + 1.039X_4 + 1.311X_5 + 0.829X_6 + 1.046X_7 + 1.877X_8 + 1.619X_{10} \]

From the equation, it can be concluded that there are three variables that mostly influence the employee shuttle service based on the value of the coefficient, these are the variable \( X_8 \) (Hygiene Facility/Dust Bin), variable \( X_2 \) (Driver’s Driving Skill), and variable \( X_{10} \) (Age of Vehicle).
5.2 Suggestion

Related to the topic of this study, there are several suggestions for the government of Bekasi regency and the future researchers.

i) For the Bekasi’ government and the district manager of industrial area of Jababeka 1 Cikarang, it is needed to carry out cooperation to organize the employee shuttle service and to see feedback from the service users.

ii) For the Ministry of Transport, it is needed to develop the minimum service standards for employees transport.

iii) For further researcher, it can be used as guidance to study in other industrial area as the further research area.

References

[1] Ministry of Transport, Traffic and road-based public transport act No 22 Year 2009, Indonesia, (2009)

[2] Z. Idris, Study on public transport passenger satisfaction at Yogjakarta Province, J. Dinamika Teknik Sipil, 9(2), 189-196 (2009) (in Bahasa Indonesia)

[3] Supoyo, Prospect of employes shuttle service a case study at central office of Center Java Province, Master Thesis, Universitas Diponegoro, Semarang, Indonesia, (2004) (in Bahasa Indonesia)

[4] D. Supriyatno, H. Sulistio, L. Djakfar, and A. Wicaksono, Guided-busway needs modeling using structural equation model, J. Transportasi FSTPT, 12(2), 143-152 (2012) (in Bahasa Indonesia)

[5] Nurtania, and A. Saddad, Factors affecting quality of service, J. Administrasi Pembangunan, 2(1), 93-98 (2013) (in Bahasa Indonesia)

[6] T. Prasetyo, L. Djakfar and S. Abusini, Preliminary study of school bus operation (Case study: Bus Halokes Malang), Proc. of The 18th FSTPT International Symposium, Lampung, Indonesia, (2015)