

Effectiveness of Transjakarta Bus in Tackling Traffic in Jakarta: Case Study of Total Transjakarta User Analysis

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Abstract: The purpose of this research is to know the effectiveness of Transjakarta bus in tackling traffic jam in Jakarta. The research method used survey method with quantitative approach and calculation Manual of Indonesia Road Capacity. The result of the research on the number of Transjakarta users has not been effective and the congestion still occurs in the area around the stop until it reaches 7x from the normal limit of travel, that is 0.6 and this proves that the existing theory of push and pull theory can not significantly influence the switching of private vehicles to the Transjakarta bus. The survey results on Transjakarta user respondents, at several Transjakarta bus stops in South Jakarta, West Jakarta, North Jakarta, East Jakarta, Central Jakarta. indicate that Transjakarta bus has not been effective in overcoming traffic congestion in Jakarta. However, other indicators indicated the success of Transjakarta. Most of the respondents stated good. such as 1) smooth, fast, 2) safe or secure, 3) has a high enough capacity, 4) regularity in transportation services, low cost, convenient, 5) Fast passengers up and down process 6) Efficient ticket payment process, (7) Effective and transparent bus operator arrangement process, especially in North Jakarta: (8) Clean and comfortable fleet and stop (9) Superior marketing techniques, (10) Excellent customer service.

1 INTRODUCTION

Considering the growth of public transportation demand in controlling congestion in Jakarta to regulate the transportation needs of society to be fair on the highway, during the leadership of Governor Sutiyoso on the second period (2002-2007) began to initiated to develop mass transportation system which integrated, both bus based (BRT = Bus Rapid Transit) and train (MRT = Mass Rapid Transit). In realizing as a mass transportation mode in Jakarta, the development plan is then concluded in 2002 APBD. For 11 years, Transjakarta colored Jakarta from the achievement that emerged until the occurrence of several accidents. Mass transportation that has become part of Jakarta is still delivered pros and cons. The initial phase of the Transjakarta to address congestion has a good objective as a solution to address the growing number of people and private vehicles. So the question is, whether Transjakarta has become a solution to congestion? The massive congestion in Jakarta has several reasons that we can see directly, namely: The use of private vehicle always increased from year to year

and this not only makes the increase in vehicle but also exacerbate congestion in Jakarta. The bought of private vehicle not only on car but also on motorcycle that increasingly meet the streets of DKI Jakarta. The increase of private vehicles is not accompanied by the increase of roads in DKI Jakarta.

2 LITERATURE REVIEW

According to Nelson, Bus Rapid Transit (BRT) in the United States is relatively recent. BRT has many promises, one of which is enhancing the economic development prospects of firms locating along the route. Another is to improve overall metropolitan economic performance. They evaluate this issue with respect to one of the nation's newest BRT systems that operates in a metropolitan area without rail transit: Eugene-Spring field, Oregon. While the metropolitan area lost jobs between 2014 and 2010, jobs grew within 0.25 miles of BRT stations. Using shift-share analysis, we find that BRT stations are attractive to jobs in several economic sectors.

Planning and policy implication are offered along with an outline for future research (Nelson, Arthur C., et al. 2013 : 41-57).

Public transport is all means of transportation where passengers do not use their own vehicles. Whether private cars or private motorcycles. The definition of public transportation is any motor vehicle that is provided for use by public with a fee charged either directly or indirectly. Public transportation is an alternative transportation within the city, especially for people who do not have private vehicles, so the need for these facilities and infrastructure is needed in urban areas.

As rural public transit systems are vital to the livelihood of rural Americans, improving the operations of these systems is the focus of this work. The use of performance measures to evaluate operation is essential to maintain growth and avoid becoming stagnant. The main goal of this study was to examine existing performance measures (PM) and modify them to allow for comparison of performance among rural transit agencies in Alabama. The tasks presented in this paper are a review of performance measures, data collection, and data analysis for agencies in Alabama. The report concludes that performance measures can be developed that balance external factors in the analysis and allow for a fair comparison of agencies (Anderson, Michael & Khan, Tahmina. 2014: 1-13).

The objective of this paper belongs to Hou, Yueying, et al. is to analyze service reliability of bus rapid transit (BRT) taking Changzhou BRT as an example. Headway irregularity, potential waiting time, and reliability buffer time are recommended to measure service reliability of BRT. Temporal and spatial distributions and comparisons are analyzed. Findings are that passengers of Changzhou BRT need to budget, on average, an extra 3-5 minutes beyond their typical journey time for selected origin-destination pairs to ensure on-time arrival at destination with 95% probability. Extra time budgeted for bus waiting beyond mean waiting time contributes to more than 80 percent of extra time budgeted for a journey, while only 20 percent is budgeted for in-vehicle travel time. Service reliability is best near a route's origin terminal and gradually deteriorates along the route, then improves when approaching the route's end (Hou, Yueying, et al. 2014: 113-133).

Public Transport plays an important role in a city's economy and its social equity. It is also instrumental in reducing automobile dependence and traffic congestion. Several factors must come together to achieve well-functioning public transport

systems. One major factor is the level of accessibility offered by the public transport system. To better understand and consequentially enhance accessibility, we must be able to measure it and map it, which is the key aim of this paper (Shah, Jay S & Adhvaryu, Bhargav. 2016: 19-35).

This paper belongs to Foell, Stefan, et al. Present an analysis of regularity in public transport usage based on a large-scale bus transportation data of Lisbon, Portugal. By exploring the combined information from the bus boarding history of riders and bus arrivals at each bus stop, an analysis of individual bus usage was performed. Daily and weekly patterns were extracted, from which it was observed that a rider takes, on average, 2 trips, visits 1.93 distinct stops, and uses 1.55 distinct bus lines daily. Inter-trip time analysis revealed a daily cycle, and a study of the interaction between riders and bus infrastructure explored how usage was concentrated on particular bus lines and stops (Foell, Stefan, et al. 2016:161-177).

The aim of Nwachukwu study was to investigate passenger satisfaction with the service quality attributes of public bus transport services in Abuja, Nigeria. To achieve this, a survey was conducted between February and July 2011. In 10 sample bus stop areas selected for this study, 300 public bus transport users were randomly selected to elicit their overall satisfaction and factors that influenced their satisfaction in the use of public bus transport services in Abuja using a self-rated questionnaire. Data obtained were analyzed using descriptive statistics, correlation, and principal component and regression analyses. The result of these analyses showed that passengers were not satisfied with the public bus transport services in Abuja. Using principal Component Analysis (PCA), four underlying factors were extracted that influenced passenger satisfaction with public bus transport services in the city. The four components together explained 83.87 percent of the cumulative variance of PCA, leaving 16.32 percent of the total variance unexplained. The standardized regression coefficients further showed that comfort has the greatest impact on overall satisfaction, followed by accessibility. Adequacy and bus stop facilities were the third and fourth factors in the order of relative importance in influencing passenger satisfaction of public bus transport services in the city. On the basis of the findings, recommendations were made to improve public bus transport services in the city of Abuja (Nwachukwu, Ali A. 2014: 99-119).

According to Brechan, a random effects meta-analysis of the results from 15 projects involving

price reduction and 9 projects involving increased services frequency showed that both price reduction and increased services frequency generated public transport travels. On average, The increased services frequency projects generated more travels by public transport than the price reduction projects. In the increased service frequency projects the proportion of travels generated by the increased frequency was strongly influenced by the size of the frequency increase. In the price reduction projects, we did not find a significant effect of the size of the price reduction on the proportion of travels generated by the price reduction. Finding that people's use of public transport was related to the extent of the service offered suggest they have a need for transport that can be fulfilled with public transport. Although people appreciate lower fares in general, finding that use of public transport was not significantly related to the size of a price change suggests the effect of price change is uncertain (Brechan, Inge. 2017:139-156).

This paper belongs to Shiftan, Yoram, et al. incorporates insights from relevant consumer behavior research in marketing to travel mode choice by adopting the loyalty model, a decision-making model, to better understand and evaluate passenger attitudes toward public transport modes. This paper describes the loyalty model and demonstrates and validates its use in transportation using a case study of a choice between two modes, rail and bus. Based on factors analysis, two factors from the loyalty model were identified : loyalty, which measures the repeat purchase of the services and the passenger's attitude toward it; and hedonic commitment, which measures the emotional feeling after using a mode. The full loyalty model was validated for both rail and bus passengers. The research shows that, like other consuming products toward which subjective emotional feeling affects the consumer's behavior, passenger choice is significantly affected by subjective emotional feelings toward the mode. Additionally, the subjective effect can be measured easily using marketing research techniques (Shiftan, Yoram, et al. 2015:1-16).

2.1 Jakarta Transportation

The road network in DKI Jakarta Province from 2009 to 2012 has increased approximately 1-6% per year. Increased road length only occurred on provincial road. The total length of provincial roads for 2012 is 7094 km equals to 2011 while 2010 reached 6743 and 2011 reached 6409 kilometers.

For road transport infrastructure, the number of terminals in DKI Jakarta Province in 2013 is 11 locations with details for Type A terminals of 5 locations, Type B terminals of 6 locations, and no Type C terminal. Motor Vehicle Testing Unit is located in 6 locations with a total of 213 testers and a total of 13 types of mechanical testing equipment and 2 non mechanical equipment. While there are 3861 units of public transportation which are shaded by 67 POs, there are 91082 units of AKDP, and there are 5423 transport tourism by 120 POs in 2013. For road transportation, the number of motor vehicles in DKI Jakarta has increased each mode of transportation with a total percentage increase of 10% where the largest number of motorcycle modes with percentage increase of 13%.

2.2 Transjakarta Passengers

Passenger is a person who is in a vehicle other than a driver and the crew of the vehicle. Transjakarta passenger on January 15 – 31, 2014 are free of charge. This is done as a promotion to Transjakarta Busway existence. Transjakarta passenger growth. The plan to make the campaign free in the first two weeks was not in vain. The increase after the promotion remain very high. At the beginning, on each month, Transjakarta increased more than 60.000 passengers and the density of passenger occurred on weekdays of 54.000 people, while on weekends, holiday and public holiday is 39.000 people.

2.3 Congestion

According to research from Japan International Corporation Agency (JICA), if the direction of urban development and transportation system is not immediately solved with the serious action, it is predicted that by the end of 2014, Jakarta's transportation system will be in a permanent gridlock.

The handling measures according to Sutomo (2001) et al. consists of several efforts; including the addition of road network, the implementation of congestion management, the determination of transportation policies and mass transportation.

3 RESEARCH METHOD

This research uses descriptive quantitative research method with survey technique for congestion data of DKI Jakarta Province. Survey conducted by

researchers based on directives from the Directorate of Traffic section of GATUR (Security and Arrangement). The data collected is divided into two, namely; primary and secondary data. The research form are observation and in-depth interviews conducted in South Jakarta area, precisely along with the road of Corridor VI (Six) of Transjakarta, from Ragunan to Dukuh Atas. The distribution of questionnaires to respondents regarding the success indicators of Transjakarta is conducted in 12 bus stops in North Jakarta, Central Jakarta, West Jakarta, South Jakarta and East Jakarta. The study was conducted from April to October 2016.

4 RESEARCH RESULT AND DISCUSSION

4.1 Push and Pull Analysis

This analysis is by looking at Transjakarta trip that has been counted 11 years about the benefit and growth of Transjakarta users through scale per year. The growth of Transjakarta passengers shows an increase level every year (BPS with processed data. 2014). The increase of Transjakarta passenger since 2004 to 2005 shows the number of 39.4% and continually increase until 2011. As a significant increase occurred when the corridor of the busway was added as in 2006 to III corridor, 2007 became VII corridor, 2010 becomes X corridor, and 2013 becomes XII corridor. On 2015 when it was still under construction for XV corridors and corridors built using overpasses, but the number decreased by the year 2012.

This increase indicates the increasing travel needs of Jakarta residents from the beginning of Transjakarta's development with free tickets until Transjakarta has been 11 years with tickets that have not experienced price increases. Transjakarta empty stool is now occupied and counted the survey of YLKI on 2012, showed that 11.8% of private car users switch to Transjakarta, so that in TransJakarta's busy hours crowded with passengers.

4.2 The Effectiveness of Transjakarta

In tackling the congestion required the quantity of Transjakarta passengers who can be transported maximally in reducing the space of vehicles on the roads on capital, jammed into difficult to walk because road filled with vehicles.

Before being said which is effective or ineffective can be chosen, the influence generated by Transjakarta as primadonna transportation in DKI Jakarta shows the comparison of Trasjakarta passenger is 29% private car, motorcycle 54%, bus 13% and transjakarta 4%.

Transjakarta passenger in the calculation of a week during peak hours have not dominated the area around the Deptan (Department of Agriculture) shelter. Its dominated by motorcycle first, and private cars on second place. At Mampang bus stop, Transjakarta passenger during peak hours and other vehicle users conducted during the week are; 27% cars, 57% motorcycles, 14% buses, 2% Transjakarta. This data shows that more than 50% of vehicle around the Mampang shelter are motorcycles. The percentage on Transjakarta is still small and far form targert compared to the others. Further comparison of vehicle users with Transjakarta passenger at GOR (*Sports Arena*) shelters is; car 49%, motorcycle 38%, bus 10%, Transjakarta 3%.

Based on data. Shows the car dominates about 50% of other vehicles, the second place filed by motorcycles, then buses and the last place is Transjakarta. The data above then take the overall comparison between vehicle users with Transjakarta passengers and the effectiveness of Transjakarta in tackling congestion; 70% motorcycles, 26% cars, 1% bus, 3% Transjakarta. This data indicates that Transjakarta's carrying capacity in attracting passengers to switch to Transjakarta has not dominated yet. Road users, still choosing private vehicles rather than public transport. Capital city citizen does have many activities so it requires a private vehicle to meet the needs of mobilization.

Based on the calculation of effectiveness, it can be concluded that the number of Transjakarta passengers has not been effective, this is an evident from the simple statistical methods by Institution of Research and Development, Ministry of Internal Affairs year (Litbang Depdagri), 1991. Based on the data, the reaseracher known effectiveness of Transjakarta accounted for 40%.

Based on the Transjakarta Success Indicator data, respondents in one corridor in North Jakarta, Central Jakarta, West Jakarta, South Jakarta and East Jakarta are said as follows: (1) speed (smooth or fast), North Jakarta: 50%, Jakarta Central: 66.7%, South Jakarta: 66.7%, East Jakarta: 58.3%, unless West Jakarta passenger stated: 58.3% not smooth. (2) safety (safe or secure), North Jakarta: 83.3%, Central Jakarta: 83.3%, West Jakarta: 91.7%, South Jakarta: 75%, East Jakarta: 83.3%, (3) Capacity (Transjakarta has bigger capacity) North Jakarta:

66.67% say no, Central Jakarta: 66.67%, South Jakarta: 50%, East Jakarta: 75%, unless 58.3% West Jakarta passenger stated no capacity (4) frequency (number of times transport service is done within certain time, e.g: weekly and month), North Jakarta: 50%, Central Jakarta: 58.3%, West Jakarta: 66.7%, South Jakarta : 50%, East Jakarta: 58.3%, (5) regularity (regularity in transport services), North Jakarta: 66.67%, Central Jakarta: 83.3%, West Jakarta: 58.3%, South Jakarta: 66.67%, East Jakarta: 75%, (6) comprehensive (transportation services implemented comprehensively from place of origin to destination), North Jakarta: 83.3%, Central Jakarta: 100%, West Jakarta: 75%, South Jakarta 83.3%, East Jakarta: 83.3%, (7) responsibility (responsible for loss or damage) North Jakarta: 58.3%, Central Jakarta: 60%, unless 75% West Jakarta passenger stated no responsibility , Central Jakarta: 100% stated no responsibility, East Jakarta: 83.3% stated no responsibility, (8) acceptable cost (low cost) or affordable price, North Jakarta: 100%, Central Jakarta: 100%, West Jakarta: 100%, South Jakarta: 91.7%, East Jakarta: 100%, and (9) comfort or convenience; North Jakarta: 66.7%, Central Jakarta: 83.3%, West Jakarta: 75%, South Jakarta: 75%, East Jakarta: 83.3%, (10) Exclusive Special Lane (Segregated Busways) respondents stated no. North Jakarta: 66.7%, no exclusivity. Central Jakarta: 75%, no exclusivity. West Jakarta: 75%, no exclusivity. South Jakarta: 58.3%, no exclusivity. East Jakarta: 58.3%, no exclusivity. (11) Rapid Boarding and Alighting process, North Jakarta: 83.3%, Central Jakarta: 66.6%, West Jakarta: 58.3%, South Jakarta: 66.67%, East Jakarta : 58.3%, (12) Efficient ticket payment process, North Jakarta: 100%, Central Jakarta: 75%, West Jakarta: 75%, South Jakarta: 91.7%, East Jakarta: 100% (13) Effective and transparent bus operators' regulation process; North Jakarta: 75%, Central Jakarta: 58.3%, West Jakarta: 58.3%, South Jakarta: 58.3%, respondents stated no. East Jakarta: 66.7%, (14) Real-time and informative information management system, North Jakarta: 66.67%, Central Jakarta: 58.3%, West Jakarta: 66.7% stated not informartive. South Jakarta: 50%, East Jakarta: 58.3%, (15) Priority bus at intersection, North Jakarta: 50%, Central Jakarta: 58.3% of respondents stated no, West Jakarta: 58.3%, South Jakarta: 58.3% of respondents stated no, East Jakarta: 83%, (16) Integration of modes with other convenient and convenient transportation at North Jakarta bus stop and terminal: 75%, Central Jakarta: 66.7%, West Jakarta : 66.7%, South Jakarta: 66.7%, East Jakarta: 66.7% (17) Condition of fleets and shelters; clean,

safe and comfortable; North Jakarta: 75%, Central Jakarta: 75%, West Jakarta : 58.3%, South Jakarta: 58.3%, East Jakarta: 83.3%, (18) Superior marketing technique, North Jakarta: 75%, Central Jakarta: 91.7%, West Jakarta: 58.3 %, South Jakarta: 66.7%, East Jakarta: 58.3%, (19) Excellent customer service, North Jakarta: 66.7%, Central Jakarta: 75%, West Jakarta: 75%, South Jakarta: 58.3% of respondents stated no, East Jakarta: 83.3%, (20) Transjakarta pathways that have been sterilized from other vehicles and most respondents said no. North Jakarta: 58.3% no, Central Jakarta: 58% no, West Jakarta: 66.7% no, South Jakarta: 83.3% no, East Jakarta: 75% no, (21) Transjakarta bus has effectively overcome congestion. Most of the respondents stated that they are not in Jakarta. North Jakarta: 83% no, Central Jakarta: 100% no, West Jakarta: 91.7% no, South Jakarta: 75% no, East Jakarta: 83% no.

From the above indicator, Transjakarta has not achieved success and most of Transjakarta passengers, revealed that Transjakarta has not effectively overcome traffic jam in Jakarta.

5 CONCLUSIONS

Based on the result of the calculation of the effectiveness of Transjakarta passengers has not been effective, because there are still many road users to choose private vehicles instead of public transportation. This is also evidenced by the high number of private riders and Transjakarta's carrying capacity in attracting passengers to switch to Transjakarta has not yet dominated.

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