EFFICIENCY BETWEEN THE USE OF TRAINS AND BUSES AS PUBLIC TRANSPORTATION

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Abstract

The level of land traffic density particularly roads in urban cities in Indonesia are very tight. This condition is coupled with the growth of population that continuously rises along with increase of people mobility that implicated on the growing of transportation problems. In the last five years, the average of Indonesian population growth rate is 1.49 percent per year and indicated the high of traffic congestion in urban areas.

With the high level of population and traffic jam, many Indonesian people choose public transportation to support their day-to-day mobility. Public transport is one of the transportation media that used together with the pay rates for both passengers and goods.

Transportation is divided into three types, namely land, sea and air transportations. The famous affordable public transportation used by people is land transportation such as bus, train, bajaj, ojek, angkot and becak. But both of bus and train as land public transportations are only capable within the province or island. As for inter-island transportation, other additional sea transportation namely ship should be included. This collaboration is required causing by the condition of Indonesian territory geographical as archipelago country with over 17,000 islands and total areas of 735,355 square miles.

The observation of this research is conducted at seaport, particularly in the Bakauheni Seaport, Lampung Province as its case study because as a great maritime country, seaport faces its significant function. In this research, the variables that examined are time efficiency, rates, level of air and noise pollutions.

Keywords: public transportation, mobility, transportation synergy, seaport function.

1. Introduction

The level of land traffic density particularly roads in most cities in developing countries are very tight. This condition is coupled with the growth of city population that continuously rises along with the increase of people mobility that implicated on the growing of transportation problems.

Indonesia as one of developing country faces the same case. Indonesia as an archipelago country has over 17,000 islands and total areas of 735,355 square miles (Indonesian Statistic Body, 2015). Lampung is one province in Indonesia has also big maritime potential that determined the sea as centre of public traffic.

In the last five years (2010-2015), the average of population growth rate in Lampung is noted 6.33 percent per year (Indonesian Statistic Body, 2015) and this is indicated the high of traffic congestion in urban areas throughout Lampung.

With the high level of population and traffic jam, many Lampung people choose public transportation to support their day-to-day mobility.
2. Theoretical Basis

Public transport is one of the transportation media that used together with the pay rates for both passengers and goods. According to Abbas Salim (1993), transportation is defined as a system consisting of certain facilities along with the flow and control systems that allow people and goods to move from one place to another places efficiently in every time to support human activities.

According to Hadjid, Tamin, Sjafruddin and Santoso (2005), transportation is divided into three types, namely land transport, sea transport and air transport. In Lampung, the type of public transportation that is affordable and commonly used by the people is the land transportation that includes bus, train and other urban transport such as becak.

But both of bus and train as the land public transportations are only capable in transporting passengers and goods within the province or between provinces in the same island. As for inter-island transportation, other additional sea transportation namely ship should be included.

This collaboration is required in Lampung Province because of the geographical condition in Lampung is also known as archipelago area. So without an adequate transportation facilities and synergy between land and sea transportations, it will be difficult to connect all regions in Lampung.

The meeting point between land transportation and sea transportation is a seaport. Therefore, to improve the synergy between land and sea transportations function in transporting passengers and goods, the existence of seaport is required. Seeing the significance of the seaport's function, some factors that support the achievement of climate protection at a seaport must be improved, in order to serve its primary function in the process of transportation of passengers and goods in the long term.

3. Research Methods

The observation of this research is conducted at one point, namely at the seaport. Because, in Lampung as a part of Indonesia as maritime country, seaport is the central point as well as the busiest point of entry and exit of passengers and loading and unloading goods either from buses and trains in Indonesia.

Particularly, in the Bakauheni Seaport, Lampung Province with a comparative study on the efficiency of transit transport between buses and trains and its synergy with the marine transportations.

In this research, the variables as indicators that examined are time efficiency, cost or transportation rates, the level of air pollution and noise pollution.

From the above problem formulas, some research questions are appeared:

1. How does the transport mobility of both land and sea transportations associated with the increased growth of rapid population in Lampung?
2. How does the appropriate synergy model that eligible with mobility standards between land transportation and sea transportation at Bakauheni Seaport and surrounding areas?
3. How does the efficient transportation model for both passengers and goods when using buses or trains as a mode of land transportations in Lampung?
4. What kind of theoretical knowledge that can be contributed on the disciplines of urban planning and development in Lampung?

The purpose of this research is to tested the hypothesis that the choice of land transportations for both for passengers and goods, whether by buses or trains, should consider the factors of efficiency as the basis for verification of qualitative research and also as a basis to establish the meaning of mobility transportation theoretical conception associated with the successful synergies between the functions of land transportation and sea transportations.

This aim is to solve the transportation problems that experienced rapid growth. The results of this theoretical conception are beneficial to enrich the science theoretically and practically in the field of urban planning and development. Departing from the purpose of research, this study used paradigm positivism deductive-quantitative methods with secondary quantitative methods in depth: researcher goes to the field with variables that derived from the theory and inter-sciences.
The first phase of the research is done by taking a sample with proportional random method at Bakauheni Seaport in Lampung. The second phase of the research is done by data processing.

4. Research Findings and Exposure

Bakauheni Seaport was selected as a meeting point of land and sea transports in a case study to compare the costs, time and pollution level between the use of trains and buses as public transportations.

1. Efficiency estimation of cost according to the use of fuel between train and bus:

1 train carriage passenger capacity = 1,500 passengers.
1 bus way trailer capacity = 120 people/passengers.

The comparison of fuel efficiency per kilometre per litre per person:

1 unit of bus: 3-5 liters / km with its capacity for 50-120 people/passengers.
Fuel requirement = 0.0125 l / km / person

1 train carriage series: 3 liters/km with its capacity for 1,500 people/passengers.

Thus, the need of fuel for train is equivalent with 0.002 liters/km/person.

Train is more efficient in terms of fuel use and in terms of carrying passengers or capacity.

So, from the above data that has been calculated, the railway or train is the most efficient mode of transportation. The train is also superior in terms of dimension, i.e. to the level of freedom of space and in terms of fuel consumption efficiency.

This result is when viewed of its function as passenger transport, whereas if it is observed from a function as a freight transport, train is still the most efficient mode of transportation.

Because of its capacity for goods to be drawn by one locomotive/train is more than one truck unit which one in this study is equivalent to a bus.

Some types of train locomotives have even more than 3,000 horsepower of power, whereas a regular truck that is most often found on the streets in Lampung has 150-200 horsepower of power.

2. Time efficiency estimation between train and bus:

The measured distance from Bandar Lampung City to Bakauheni = 110 km.

Time needed to travel by bus from Rajabasa Bus Terminal in Bandar Lampung to Bakauheni Seaport Terminal = 3 hours per one bus.

Time needed to travel by train from Rajabasa Bus Terminal in Bandar Lampung to Bakauheni Seaport Terminal is also = 3 hours per one train. With amount of passengers = 1,500 people.

Capacity of 1 ship for one way travel in average = 1,000 people

If by a train, for one ship it is already full from one time stop of train at the seaport.
If one sea ship has to be full of passengers to start its travel from Bakauheni Seaport, so to make it full, 1 ship is need to wait passengers from:

1,000
120
= 8 buses.

The difference in the arrival time and preparing time from bus stop to enter ship between one bus with other bus in Bakauheni Seaport in average = 10 minutes.
So, to make the ship full of passengers and ready to travel needs time; 10 x 8 = 80 minutes or equivalent with 1 hour, 20 minutes.

Total time to make a ship full if passengers travel by buses from Bandar Lampung: 1 hour 20 mnt + 3 hours = 4 hours 20 minutes.

Time needed to make a ship full if passengers travel by train from Bandar Lampung: 3 hours, plus 1 minute for preparing to enter the ship.

By this study, another advantage of the train is a shorter travel time rather than buses. Even some modern trains are able to compete with the aircraft.

3. Efficiency estimation of convenience level according to the minimum affect of appeared air and noise pollutions between train and bus:

The growth of vehicles in cities are not only cause the traffic congestion problem but also air and noise pollutions. About 87 percent contribution of air pollution comes from transportation sector (Tanariboon, 1992 and OTE, 2006 in Aminah, 2010).

There are several air pollutants that are often found in cities. Judging from physical characteristics, contaminants can be:

a. Particles (dust, aerosols, lead)
b. Gas (carbon monoxide / CO, sulfur oxides / SOx, hydrocarbons, nitrogen oxides / NOx, H2S and oxidant ozone and PAN)
c. Energy (temperature and noise).

Pollutants that are produced by vehicles such as smoke, dust, grit (fine sand), and gas (CO and NO).

From the quantity estimation of amount of train and buses to be needed to full one ship in Bakauheni Seaport, amount of air pollutions from 8 buses more than from only one train.

And by the time estimation for travel by buses and one train, quality and quantity of noise pollution from buses are higher than only from one train.

5. Conclusions

By constructed the theory of "Comparison of Efficiency between the Use of Trains and Buses as Public Transportation for Both Passengers and Goods in Indonesia", it is expected to address transportation problems in Lampung that experiencing rapid development.

From the above research findings, the use of buses as public transportation for passengers and goods is more efficient in cost, travel time, and convenience level.

Recommendations for a developing provinces like Lampung, which has increased the number of people population and transportation problems, is to be more sensitive in transportat ion planning with a view of determining the type of public transportation that adapted with Indonesian geography as an archipelago country.

References

Author’s Biography

Trufi Murdiani, earned a Bachelor of Engineering (S.T.), from Civil Engineering Study Program of Bandar Lampung University (UBL) in 1999. In 2012 earned a Master of Arts (M.A.) from Ateneo de Manila University, Philippines. Currently as a lecturer of Civil Engineering and recorded as Head Engineering Study Program, Head of Engineering Drafting Studio/Laboratory and the Campus Magazine's Editor In Chief at The Gajah Sakti Polytechnic Lampung.