BUS RAPID TRANSIT USING COMPENSATION METHOD AS BUS PRIORITY SYSTEM AT ISOLATED THREE-ARM JUNCTION

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DEDICATION

I dedicate this to my mom, Rasidah binti Janaidi and my aunt, Masamah binti Janaidi for their continuous support throughout my life.
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ABSTRACT

Current nature of Malaysia society and lifestyle creates various needs of travel. Nowadays, there are more affordable cars than it was for the last decades. People choose to invest in buying themselves a car rather than using public transportation that leads to congestion on the road. Johor Bahru is also one of the cities in Malaysia that suffers traffic congestion due to the rapid increase in transit needs and population density. Perbadanan Pengangkutan Awam Johor planned to introduce Bus Rapid Transit (BRT) system to help solve the problem regarding the traffic congestion. In this paper, the implementation of BRT system in an unsignalised junction were assessed using four scenarios of mode split to determine the performance of the BRT system before and after implementation. The four scenarios of mode split involved are base scenario, 84%:16%, 62%:38% and 46%:54% of private vehicles user against public transit user respectively. Microscopic traffic simulations of PTV VISSIM was used to carried out the assessment of BRT system and compensation method was used as the bus priority system at the junction. The costs of congestion were calculated based on the results from the VISSIM simulations. The level of service for the junction were compared between the scenarios. Further analysis showed that the mode split of 46% private vehicle users and 54% public transit users are more beneficial compared to other scenarios in term of travel time and cost of delay. The level of service had improved at some of the approaches at the junction.
ABSTRAK

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<td>PAJ</td>
<td>Pengangkutan Awam Johor</td>
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<td>ITS</td>
<td>Intelligent Transport System</td>
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<td>AVL</td>
<td>Automatic Vehicle Location</td>
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<td>ATC</td>
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CHAPTER 1

INTRODUCTION

1.0 General

Vehicles are very important for human to travels from one destination to another destination. It is just matter of choosing the transportation mode for their trips. In the last decades, the levels of mobility have increased significantly in Malaysia. These can be seen in the amount of traffic congestion during peak hours or festive season in any major roads. This creates concern about the increase in the use of car and the implications in terms of congestion and pollution. Furthermore, the current nature of society and lifestyle of people in Malaysia create varieties of travel needs. There are more affordable cars nowadays than it was few years ago. That is why more people choose to invest themselves in buying the car rather than using public transport.

Currently, there are little awareness about sustainable transportation in our country that leads to improper transportation planning in the cities. The public transit service become unreliable to some of the citizen. Developing more reliable public transportation services can encourage the people to shift from using their own private vehicle into using the public transportation services. Although, changing people’s mind is a difficult task to do because human behaviours are unpredictable. They may accept or reject the proposed changes. People choose to use their own private vehicle because of the flexibility of daily trips, more privacy and comfortable. Thus, attractive services and facilities of the public transportation is important in influencing all those factors. Most of the citizen also preferred to use private car instead of using public transportation because to them owning a private vehicle is far more convenient instead of using the current public transit services. Public transport was always being the second mode of transport for the people because of few reasons. Some of the public transports are not reliable when it comes to time, there will always be delays. Other
than that, most people are not comfortable in sharing spaces with strangers. Figure 1.1 shows the current modal split of travel in Johor Bahru.

![Modal Split of Travel in Johor Bahru](image)

Figure 1.1: Current mode split of travel in Johor Bahru (Perbadanan Pengangkutan Awam Johor, 2016).

In 2015, the total population of Johor Bahru are about 1.6 million and expected to grow to 4.7 million by the year of 2045 (Perbadanan Pengangkutan Awam Johor, 2016). Rapid increase of transit needs and population density in certain areas of Johor Bahru cause congestions on the road uncontrollable and sometimes unexpected if any accident occurs on the road. Introducing Bus Rapid Transit (BRT) can help to solve the problem regarding the congestion on the road. The exclusive lane in BRT system help to reduce travel time and delay for buses by prohibiting other vehicles on the exclusive lane. Thus, the aims of implementing BRT system in a densely populated areas are improving the speeds by reducing the delays, increasing the reliability, comforts and capacity of the transit services (Merkert & Mulley, 2015; Wan, Kamga, Liu, Sugiura, & Beaton, 2016). These aims help to attract more people into using public transportation more than using their own private vehicle and leads to the change in modal split of people using the private vehicle with using bus for their daily trips.
1.1 Problem Statement

Malaysian government and the town planners always faced issues in the quality of the public transportation services. The rapid growth of the population in Malaysia causing difficulties in providing a good quality of public transportation especially in urban areas. Other than that, limited space and capital funding also contribute to the difficulties in developing proper public transit in developing area. On the basis of broad literature review, the impact for the implementation of bus priority system at an junction that are originally unsignalised junction had rarely been reported.

1.2 Aim and Objectives

The main aim of this study is to investigate the impact of different BRT scenarios at isolated vehicle actuated signalized junction. The following objectives were set up to achieve the aim of this study:

1. To identify the effect of BRT implementation in study area.
2. To examine the Level of Service of the junction before and after implementation of BRT.
3. To determine the financial benefits of developing BRT system in the study area.

1.3 Scope of Study

Due to practical constraints, this report cannot provide a comprehensive review on the application to whole route networks in Johor Bahru. Other than that, land use in the study area may limit the proposed additional exclusive lane for BRT system.

The study comprises of site investigation, microscopic simulation models and financial benefit analysis of the BRT implementation. An isolated unsignalised junction that passing through one of the routes for the proposed BRT corridors in Johor Bahru. The performance of the BRT system is analyse using microscopic simulation model based on different scenarios. The first scenarios is the base scenario or also
called the “do nothing” scenario. Three of other scenarios are after the implementation of BRT system with different model split from the base scenario. Visual inspection and traffic count survey were conducted on study area to obtain the required data for simulation. The microscopic simulation models were modelled using the PTV VISSIM.

1.4 Significance of Research

This research will provide comprehensive analysis on the improvement in term of quality for unsignalised junction from the implementation of BRT system. Changing the modal split of daily transportation mode can lead to reduction in the use of private vehicles on the road. Air pollution can also be reduced with the decreasing number of private vehicles. Other than that, the risk of accidents occurring will be lower and provide a safer road to travel.

1.5 Report Outline

This report is divided into 5 chapters by focusing on the study of BRT implementation in a densely populated area.

Chapter 1 outlines the background of the study, aims and objectives by highlighting on the problem statement and the importance of implementing BRT system in the densely populated area.

Chapter 2 reviews the literature regarding the BRT system and the case study involved in implementing the BRT system all over the world.

Chapter 3 describes the methodology used in achieving the objective of the study. Flow chart is made to show the sequence of tasks to be achieves such as identifying the area, to assess the severity of the study area, data collection, developing microscopic simulation model and result analysis.
Chapter 4 emphasizes on the analysis of results and data collected from the simulation conducted. The results were evaluated and the end products of the analysis were discussed.

Chapter 5 sums up all the reports by showing the conclusion and the recommendation of the studies conducted. This chapter will also highlight the end product of the study and provide helpful recommendations for future studies in the same area.
REFERENCES


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