TREND OF PARKING DEMAND AT MACHAP NORTHBOUND REST AREA

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Dedicated to

My beloved family, Wahab, Noriah, Wahida and Daniel
who has faith in me,

To all my friend, who stood by me facing difficulty
I will always remember you all

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ABSTRACT

Transportation planners need previous information on "Parking Generations" in order to propose new developments and to predict changes in the parking generation. Parking Generations depends on various factors such as number of facility, number of shop, and gross floor area. The Institute of Transportation Engineers (ITE) is an international body of transport professionals based in Washington, DC, USA, that publishes and updates the information on parking generation for various types of land use types in USA. In Malaysia there does not exist any parking generation guideline or handbook that can be used to estimate the parking supply. The main objective of this project is to determine the parking demand at Machap Northbound Rest Area located at Expressway. The study was conducted on different days to allow significant variation of traffic volumes. So that, the relationship between the traffic volume on major road and traffic volume entering the rest area can be determined. Each day have different traffic variation. The parameter used in this study was the vehicular volume on major road (expressway). Parking Generation Guideline by ITE was used to collect Parking demand data. The linear regression between parking demand vehicular volume shown that there is positive relationship with value of R^2 equal to 0.95.

ABSTRAK

Perancang pengangkutan memerlukan maklumat mengenai "Generasi Tempat Letak Kenderaan" terdahulu untuk mencadangkan pembangunan baru dan untuk meramalkan perubahan dalam generasi letak kenderaan. Generasi tempat letak kenderaan bergantung kepada beberapa faktor seperti bilangan kemudahan, bilangan kedai, dan kawasan lantai kasar. Institut Kejuruteraan Pengangkutan (ITE) adalah sebuah badan antarabangsa profesional pengangkutan yang berpangkalan di Washington, DC, Amerika Syarikat, yang menerbitkan dan mengemas kini maklumat pada generasi tempat letak kenderaan untuk pelbagai jenis penggunaan tanah jenis di Amerika Syarikat. Di Malaysia tidak wujud garis panduan generasi tempat letak kenderaan atau buku panduan yang boleh digunakan untuk menganggarkan bekalan letak kereta. Objektif utama projek ini adalah untuk menentukan permintaan tempat letak kenderaan di Kawasan Rehat Machap Arah Utara yang terletak di lebuhraya. Kajian ini telah dijalankan pada hari yang berbeza untuk mendapatkan jumlah trafik di lebuhraya yang berbeza. Dengan itu, hubungan antara jumlah trafik di jalan raya utama dan jumlah trafik yang memasuki kawasan rehat boleh ditentukan. Setiap hari jumlah trafik adalah berbeza. Parameter yang digunakan dalam kajian ini adalah jumlah kenderaan di jalan raya utama (lebuh raya). Garis Panduan Penjanaan Parking oleh ITE telah digunakan untuk mengumpul data permintaan Parking. Regresi linear antara permintaan letak kereta jumlah kenderaan menunjukkan bahawa terdapat hubungan positif dengan nilai R^2 bersamaan dengan 0.95.

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CHAPTER 1

INTRODUCTION

1.1 Background of study

In this recent years, the amount of vehicles on road in Malaysia are keep on increasing. Most of the vehicles are not public vehicles such as bus and taxis, but personal vehicles such as cars and motorcycles and not only that, as Malaysia is in rapid development where construction work carry out all over Malaysia, many of heavy good vehicles are seen in the road transporting material to the site. Increasing of vehicle on road will lead to the congestion in the next few year due to the capacity of vehicle for the road will be exceed from the design value. Besides that, as the vehicles on the road increase, the amount of parking area demand also affected. Thus, Transportation Planner and Traffic Engineers need to estimate the traffic volume attracted to or produced by the land uses.

Parking generation is the parking spaces required to accommodate the number of vehicle produce by the trip attraction to the area. Based on transportation engineering and planning practice, the required number of parking spaces for a facility is depend on the parking generation rate which is from the trip rate. The parking generation data are vital for transportation engineer and planner since it will be used

to conduct the parking requirement analysis and impact study. Estimation of parking generation rate for a propose land used is very essential in order to provide adequate parking space in the vicinity.

The Institute of Transportation Engineers (ITE) is an international body of transportation professionals that publishes Parking Generation. The Parking Generation provide information on parking generation based on various type of land used such as school, office building, residential house, and many more. Most of the information on the Parking Generation that available are from the suburban sites that each of them is isolated single land uses with free parking usage. Unfortunately there is no information on the Parking Generation for roadside rest areas.

Rest and Service Area (RSA) or in Malaysian term *Rehat & Rawat* (R&R) is an important facility in highway and expressway that give safety and comfort aspect for users. By stopping and resting at these facilities, it will help reducing the users fatigue and thus avoiding accidents from occur. In Malaysia, rest area or R & R facilities are built at North – South Expressway (NSE) which mean for long distance travel. Currently, there is no handbook or guideline in Malaysia that provides information on the "Parking Generation" and that can be used for estimating parking requirements.

1.2 Problem Statement

Nowadays, parking demand in Malaysia is increasing rapidly within each year as the amount of vehicle on road increasing as well. Long distance travel is commonly used by road user nowadays. As expressway in Malaysia provide long distance travel throughout west coast in Peninsular Malaysia which provide shortest time travel between country. The expressway is being handled by PLUS. Each year

the amount of expressway user increase, thus driver tend to use the rest area that being provided by PLUS organization along the expressways. The parking demand on the rest area varies throughout different season. It is normally observed that the demand on rest area is higher during public holiday.

The Institute of Transportation Engineers (ITE) is an international body representing the transport professionals from all over the world. The latest publication on the trip generation by ITE was in 2012 and The "Parking Generation", 4th Edition was published by ITE in 2010. In Malaysia, the "Trip Generation Manual 2010", published by the Highway Planning Unit of the Ministry of Works Malaysia which consist on information on trip generated by land uses in Malaysia. The trip generation manual can provide information for transportation engineer and planner on estimating the trips produced by the land uses. However there is no guideline in Malaysia that provide information to estimate future parking demand. In ITE's Parking Generation, although it includes over 108 different types of land uses but it does not cover the land use type "Rest Service Areas" located by the Expressways.

The Parking Generation of expressway rest area in Malaysia is believed to vary with time of the day, day of the week and depends on at least one or a few significant parameters. One of the characteristic influencing the parking demand is vehicular volume on major road (expressway). Vehicular volume on major road (expressway) changes with different day and season.

1.3 Objectives

The aim of this study is to find out the pattern of parking demand throughout different season at expressway rest area. To achieve the aim of this study, several objectives were pointed out as below:

1. To measure the parking demand at rest area on expressway

2. To determine the relationship between parking demand and vehicular volume on major road which is expressway.

1.4 Scope of Study

The study was conducted at Machap Northbound Rest Area on different time and days that have significant variations on vehicle volume. The findings will help transport planners to understand the nature of parking demand and to be able to predict parking demand at the expressway rest areas.

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