

**UNIVERSITI TEKNOLOGI MARA**

**SAFE FOLLOWING DISTANCE  
PREDICTIVE MODEL  
INCORPORATING VEHICLE  
HETEROGENEITY ON SELECTED  
URBAN EXPRESSWAY**

**WARDATI BINTI HASHIM**

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## ABSTRACT

With more demands due to the development progress, freight transport seems to grow rapidly around the world. The scenario lead to the high frequencies of heavy vehicle (HV) being on the road which provide a remarkable influence on the traffic flow and following behavior. This research focus on the safe distance following model with a function of headway. Most of the established models did not take into consideration of the heterogeneous condition of traffic but only determined from a car following another car. Furthermore, those models mainly did not include other important parameter such as relative speed, acceleration and deceleration rate. Therefore, the objective of the research is to propose another safety following distance model with a function of time headway that will address the shortcomings of the existing models. The research proposed the model through the analysis of empirical data which was collected using video recording method from a high point located on the bridge across three (3) expressway located in the vicinity of Klang Valley, Malaysia. Then the data was reduced using a specific software name TRAIS. Multiple linear regression of MINITAB 16 was used to estimate the model. This study separate into four different vehicles interaction namely as car-following-car (C-C), car-following- heavy vehicles (C-HV), heavy vehicle-following-car (HV-C) and heavy vehicle-following-heavy vehicle (HV-HV). The results indicate that drivers' behavior is significantly different for different vehicle being driven and/or followed. The results show that car has the shortest headway when following other car among other vehicle interaction while HV has the highest headway when following other HV. Results also indicate that the increase of speed will lead to the decrease of time headway. Furthermore, other variables which are relative speed and acceleration/ deceleration seem to have influence on the time headway, which by right improving the finding of other established model in determining the time headway for safe following distance. There is also no significant difference between the empirical and the predicted value, thus indicating that the developed model may contribute to predict the safe following distance in accordance to vehicle interaction. This finding however considered only the traffic parameters as influential factor, on a non-congested urban expressway. Study on the influence of geometric design and on other type of road of during congested time is recommended in the future.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

With more demands due to the development progress, freight transport seems to grow rapidly around the world. The urban areas seem to contribute to the large portion of freight movements. Wright in 2006 reported that the freight task is predicted to increase by 50% between 2006 and 2020 in the capital cities of Australia. Malaysia has no exception as it is reported that the total volume handled at Port Klang will rise 7.7% to 197.70mn tonnes in 2012, while volume at the Port of Tanjung Pelepas will rise by 8.2% to 130.09mn tonnes.

The scenario lead to the high frequencies of heavy vehicle (HV) being on the road which provide a remarkable influence on the traffic flow. Characterized by the loading, speed, movement behavior, dimension and size making HV to affect the traffic flow characteristic and become a main rival to passenger cars in getting the service of limited road spaces in urban area.

By simple definition, HV is known to be a commercial vehicle used for transporting goods and materials (Huang, et.al. 2005). The authority in Australia has a deeper definition of HV which is known as a motor vehicle or trailer of gross vehicle weight (GVW) more than 4.5tonnes (Commonwealth of Australia, 2009). While in Malaysia, no exact definition of HV have been learned so far yet the authority seems to rely on the term of commercial vehicle and goods vehicle (Road Transport Act, 1987).

A certain understanding level of traffic behavior is important in the growing presence of those HV affecting other road users especially passenger cars which contribute to the largest vehicle group of freeway. The interactions between cars and heavy vehicles in term of following behavior will give a significant contribution in understanding the fundamental of traffic characteristic for microscopic simulation study. Statistical analysis on trajectory data set of HV-car-movement would assist to simulate the following behavior of both entities.