

SP Based Modeling of Mode Choice for School Trip in Sylhet City

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Abstract— Choice of travel modes for school trip are modeled in this paper using discrete choice analysis to identify the most influential factors that induces people to use school bus. A Multinomial Logit (MNL) mode choice model was developed in this regard using Stated Preference (SP) surveys. Model was generalized using two case studies; Blue Bird School & College and Scholarshome. Both of the schools are located in Sylhet City Corporation (SCC) area, one of the major city of Bangladesh located north east part of the country. Attributes and their levels for SP survey were taken from preliminary survey conducted on the guardians. From model output, travel time, travel cost, teacher as supervising person and separate bus service for each school were found more influential factors for guardians to consider school bus for their children. Socio economic characteristics of guardians were also found significant to travel mode choice for school trip of their children. The results of the study can help the Sylhet city authority to formulate school bus related policies to reduce the number of vehicles on the roadway. The findings can also be useful for other cities of Bangladesh as well as for other developing countries, particularly those in Asia, which share similar socio-economic characteristics.

Index Terms— School trip, discrete choice, multinomial logit, stated preference, attributes

I. INTRODUCTION

High population density with limited road networks is the major cause of traffic related problems in the major cities of Bangladesh leading to capital city Dhaka. Huge traffic congestion is the daily scenario for the city trip makers. Situation becomes worst in peak hour at the starting and closing time of office, school and college [1, 2]. Moreover, a large number of commuters use private car (low occupancy vehicle) for office trip in the absence of better quality public transport which also increase the number of vehicles on the roadway. In addition, large number of schools and colleges are located in city center which attract huge traffic during peak period. School and college authorities do not provide travel facilities which induces people to use car, rickshaw or auto rickshaw (Compressed Natural Gas, CNG, operated) for school trip. All these lead to extra pressure on city transportation system and increase Vehicle Miles Travelled (VMT).

Similar situation exists in the Sylhet city, one of the major city of Bangladesh. This city is supporting around 0.9 millions

of people with density of 32400 per square mile [3]. City road network is not sufficient to ensure smooth travel of this huge population which results traffic congestion in city road network. In addition, narrow road, on road parking, unauthorized road side activities, on road pedestrian movement and mix traffic increase the congestion index of the city [4]. Moreover, a large number of school and colleges were established on roadside without any parking facilities. Significant number of students commute using private vehicles or low occupancy vehicles that increase the number of vehicles on roadway and imposes huge congestion in the road network adjacent to schools due to loading and unloading of students during school starting and closing time. It is established in literatures that introducing school buses can go a long way in curbing school traffic related congestion [5, 6]. Therefore, focus of this paper is to develop a transport mode choice model for school trips in Sylhet city with special concentration on modeling preference of school bus services. Blue Bird School & College and Scholarshome, two best institutions inside Sylhet city corporation area, were considered as study area. The estimated model can provide useful insights on travel mode choice for school trips in Bangladesh and can help in policy formulation that can induce people to use the school bus with reduction of travel demand. Moreover, the proposed model framework can be applied in modeling similar choices, both for developed and developing countries.

II. LITERATURE REVIEW

Several researches were conducted worldwide focusing school trips. Ewing, Schroeer and Greene [7] analyzed the factors affecting choice of travel mode for school trip using revealed preference (RP) data from schools in Gainesville, Florida. They found factors such as school size, school enrollment and land use variables such as density and mix to be insignificant in mode choice. Rhoulac [8] investigated the factors affecting mode choice by performing mode choice modeling on two modes - school bus and cars, his findings indicated that factors such as total number of students in a household, student grades, household income, comfort level and perceptions of safety are significant in the decision making process. Vovsha and Petersen [9] investigated how the decision to escort children to school by parents is affected by intrahousehold interactions. They considered children as active agents in the decision making process and developed a choice model for ride sharing. Factors such as the escort's gender and the children's age were found to contribute significantly in the decision to escort. Schlossberg *et al.* [10]

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