

This thesis titled "**CHOICE OF TRAVEL MODE FOR THE TRIP TO WORK IN DHAKA CITY BY STRUCTURAL EQUATION MODELING**" submitted by Md Ashraful Islam, Roll No 1012110008, Session 2012-2013 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Masters of Science in Civil Engineering (Transportation) on 02 July 2019.

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## DECLARATION

I hereby declare that this thesis is my original work and it has been written by me entirely. I have duly acknowledged all the sources of information which have been used in the thesis.

This thesis has also not been submitted for any degree in any university previously.

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Md Ashraful Islam

02 July, 2019

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## ABSTRACT

Mode choice and trip chaining behavior of developing cities are becoming more complex gradually due to rapid urbanization and economic growth. This thesis is aimed to determine the major factors that affect the mode choice for work trips in Dhaka city by structural equation model (SEM). A two-step methodology has been adopted for this research. The first part addresses data collection approach incorporating a purpose built questionnaire survey and the second part is to develop SE Model. A questionnaire survey was conducted at 14 locations of Dhaka City. A total of 1000 work trip makers were interviewed. Four different models are developed to find out the correlation between mode choice attributes and effects on overall mode choice. For each model there is a shuffling of exogenous, endogenous and latent variables to examine models for better results. A two tailed test is used for analyzing the parameters with a critical value of 1.96 for 95% confidence limit. For the final proposed models, it was revealed that all endogenous variables are positively related with latent variables. Out of four models, the best one is selected based on statistical parameters and resemblance with real life anticipations. Two latent variables trip chain, trip behavior and 14 endogenous variables have been considered in model 4. The result shows that among all attributes, waiting time at station, time taken to reach destination, comfort level of the mode and travel by bus/tempo having coefficient values 0.67, 0.33, 0.86 and 0.88 respectively influence users' choice of mode significantly. "Simple home to work and work to home" type trip chain has positive effect on the latent variables. It was found that fit indices of the best model are within the range (CFI=1.00, RMSEA=0.000, SRMR=0.000), indicating a good model. The results match with real world scenario. Results of this research are expected to help transport planners to understand mode choice and trip chaining behavior and facilitate development of relevant transportation policies of assessing infrastructure investment.

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## **LIST OF ABBREVIATIONS/ACRONYMS**

BBS - Bangladesh Bureau of Statistics  
BRT - Bus Rapid Transit  
BRTA - Bangladesh Road Transport Authority  
BUET - Bangladesh University of Engineering and Technology  
CNG - Compressed Natural Gas (here CNG Auto-rickshaw too)  
DCC - Dhaka City Corporation  
DHUTS - Dhaka Urban Transport Network Development Study  
DIT - Dhaka Improvement Trust  
DITS - Greater Dhaka Metropolitan Area Integrated Transport Study  
DMA - Dhaka Metropolitan Area  
DMAI - UDP Dhaka Metropolitan Area Integrated Urban Development Plan  
DMDP - Dhaka Metropolitan Development Plan  
DSMA - Dhaka Statistical Metropolitan Area  
DTCB - Dhaka Transport Coordination Board  
DUTP - Dhaka Urban Transport Project  
EPTRI - Environment Protection Training and Research Institute  
GDP - Gross Domestic Product  
GOB - Government of Bangladesh  
HBE - Home Based Education  
HBO - Home Based Other  
HBW - Home Based Work  
HH - Household  
HIG - Household Income Group  
HIS - Household Interview Survey  
IIA - Independence from Irrelevance Alternatives  
JICA - Japan International Cooperation Agency

LIG - Low Income Group  
LISREL - Linear Structural Relation  
MIG - Middle Income Group  
MNL - Multinomial Logit  
MNLR - Multinomial Logistic Regression Analysis  
MNP - Multinomial Probit  
MV/MT - Motorized Vehicle/ Motorized Traffic  
NHB - Non Home Based  
NHBB - Non Home Based Business  
NL - Nested Logit  
NMV/NMT - Non-motorized vehicle/ Non-motorized Traffic  
NNNL - Non-normalized Nested Logit  
RAJUK – Rajdhani Unnayan Kartipakkha  
RP - Revealed Preference  
RUM - Random Utility Model  
SP - Stated Preference  
SQ – Service Quality  
STP - Strategic Transport Plan  
STRADA - System for Traffic Demand Analysis  
PT- Public Transport  
TAZ - Traffic Analysis Zone  
TRB - Transportation Research Board  
UMNL - Utility Maximization Nested Logit  
UN - United Nations  
UNDP - United Nations Development Program  
UTP - Urban Transport Planning  
WB - World Bank