



Cairo University

**DEVELOPMENT OF DISAGGREGATE STATED
PREFERENCE MODE-CHOICE MODELS AND
ELASTICITIES FOR LARGE, MEDIUM, AND SMALL
SIZE UNIVERSITIES IN GREATER CAIRO**

By

Mohammed Shaaban AbdelZaher Alfeky

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
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CIVIL ENGINEERING – PUBLIC WORKS

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DEVELOPMENT OF DISAGGREGATE STATED PREFERENCE MODE-CHOICE MODELS AND ELASTICITIES FOR LARGE, MEDIUM, AND SMALL SIZE UNIVERSITIES IN GREATER CAIRO.

Key Words:

Mode choice; Stated preference; Greater Cairo Region universities; Sensitivity.

Summary:

This research investigates mode choice models that best describe the behavior of Greater Cairo Population for the trips HWB, HEB. For the modeling purposes, a sample from the (GC) population is used. This sample was selected to cover different categories in (GC). Various mode choice models are developed using Software Package BIOGEME. Multinomial Logit mode choice models calibrated for various trip purposes are to get preliminary conception about utility specifications. Valid chosen attributes are tested statistically with SPSS statistical software. From early observation of data files, it is found that a high percentage change of trips are made using combined modes (multi-modal trips). Sensitivity analysis is developed for +/-50% of time and cost attributes to taste sensitivity of attributes for each alternative mode.

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Nomenclature

BIOGEME	Bierlaire's optimization toolbox for GEV model estimation
GEV	Generalized extreme value distribution models
CBD	Central business district
CREATS	Cairo Regional Area Transportation Study
CTA	Cairo Transit Authority
DRTPC	Development Research and Technological Planning center
ENR	Egyptian National Railway
GCR	Greater Cairo Region
HIS	Home Interview Survey
HBW	Home Based Work
HBE	Home Based Education
IIA	Independence of irrelevant alternative
MNL	Multinomial Logit models
RPS	Revealed Preference Survey
SPS	Stated Preference Survey
CAPMAS	Central Agency for Public Mobilization and Statistics
CA	Conjoint analysis
WTP	Willing To Pay
CV	Contingent Valuation
PSL	Path Size Logit
SAM	State-augmented multimodal network
SUE	Stochastic User-Equilibrium
CAPI	computer assisted personal interviewing
ITS	Intelligent Transportation Systems
TMC	Traffic Management Center
LOS	Level of service
ILTP	Integrated Local Transport Plan
MAG-LEV	Magnetically Levitated Systems
RP	Revealed preference
SM	Swizz Metro

Abstract

Development of mode choice models are very important to support decision makers to develop better policies and to improve the operational and environmental conditions of transport networks. This research investigates mode choice models that best describe the behavior of universities of different sizes in terms of students, staff, and workers in Greater Cairo. For the modeling purposes, a sample from the (GC) target population as described is identified and data include socio-economic and mode characteristics is collected. This sample is selected to cover different universities population categories in (GC) as Cairo University (large size example), Ain-Shams University (medium size example), and Helwan University (small size example) which are selected to minimize the selection criteria. These sample universities are considered as destination for mode choice models calibrated in this research. These universities are also selected based on the surrounding modes network, such as road networks for all private and public modes and also metro network and combined modes. A questionnaire is designed to collect information about the mandatory early trip to the university from origins (i.e., Home based work HBW and Home based education HBE). The study area includes universities Campus and surrounding areas. Stated Preference data is collected via the “paper sheets” and by “Online-Google sheets” with 400 completed forms.

Various mode choice models are developed using Software Package BIOGEME. Multinomial Logit mode choice models calibrated for various trip purposes are to get preliminary conception about utility specifications. Valid chosen attributes are tested statistically with SPSS statistical software. From early observation of data files, it is found that a high percentage change of trips is made using combined modes (multi-modal trips). Sensitivity analysis is developed for +/-50% of time and cost attributes to taste sensitivity of attributes for each alternative mode. It is found that around 65% of users choose combined modes as their preferred choice. Most of chosen parameters are statistically significant at 95% confidence interval in most of models developed. Most of Greater Cairo Region traveleres give higher priority to cost rather than time.