URBAN TRAVEL MODE CHOICE BEHAVIOUR MODELLING

by

BAIKUNTH NATH

DEPARTMENT OF CIVIL ENGINEERING

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CERTIFICATE

1. I am satisfied that the thesis presented by Mr. Baikunth Nath is worthy of consideration for the award of the degree of Doctor of Philosophy and is a record of the original bonafide research work carried out by him under my guidance and supervision and that the results contained in it have not been submitted in part or full to any other university or Institute for award of any degree/diploma.

2. I certify that he has pursued the prescribed course of research.

(Dr. S.K. DEB)
Supervisor of the Student
Department of Civil Engineering
LIT. Delhi

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ABSTRACT

The present research study entitled "Urban Travel Mode Choice Behaviour Modelling" is a perfect demonstration for application of fuzzy set theory in the field of transportation planning. For application of the fuzzy set theory, an attempt has been made to collect primary data from the two metropolitan cities in India, viz., Delhi and Calcutta. These cities have been identified and selected primarily on the basis of the complex traffic and transport conditions resulting in severe commuting problems to the commuters performing day to day journey to the place of work. With the growth of population and activities, the transport demand has escalated phenomenally. The road based mass transport system in Delhi urban area has failed to meet this demand efficiently, while the supply for the transport demand in Calcutta is increasingly becoming inadequate inspite of water based and underground mass transportation system. Major effort has been made to collect the primary data in a much more comprehensive manner from central business district of Delhi urban area while a limited data were collected to test the application of fuzzy set theory on two travel corridors in Calcutta.

The mode choice analysis is an important stage in the four-stage transportation modelling process. Mode choice analysis, in the present study, has been primarily confined to study the selection of predominant mode of travel by different income groups of commuters for different ranges of travel attributes. The subject of mode choice analysis is a quite complex aspect dealing with understanding the decision-making process of all individual in respect of income and socio-economic background. Though many researchers in the past had attempted to appreciate the mode choice behaviour modelling by using the conventional techniques, yet the present mode choice analysis carried out is to a great extent subjected to a domain of fuzzy language. In a real world situation, people cannot quantify the

values of the system attributes in a correct manner and therefore, the use of the linguistic variable such *satisfied, acceptable, poor* etc. is increasingly being accepted in defining the transportation system attributes. The subjective decision making comes in the domain of fuzzy set theory which is progressively recognized as an important area in the decision making process.

Keeping this in view, the present research study attempts to explore the possibility of applying the fuzzy set theory in the decision making process of selecting the predominant modes of travel along with the next order of priority of travel modes.

A detailed methodology of this application has been demonstrated step-by-step with examples including the selection of travel attributes, alternative modes of travel, development of membership function, construction of rating matrices and dominance matrices. Finally the predominant modes of travel for different income groups of commuters have been determined using the fuzzy set theory. The results were validated with the real life primary data collected in the latter part of the study.

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