

TRANSPORTATION PLANNING AND POLICY DESIGN FOR DELHI URBAN REGION : A SYSTEM DYNAMICS APPROACH

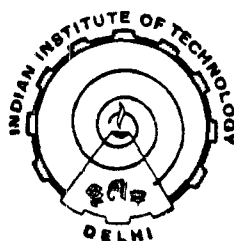
by

Indra Kumar Khanna

Department of Mechanical Engineering

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of the requirements for the degree of

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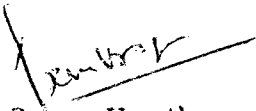
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CERTIFICATE

The thesis entitled "Transportation Planning and Policy Design for Delhi Urban Region: A System Dynamics Approach" being submitted by Mr. Indra Kumar Khanna to the Indian Institute of Technology, Delhi, for the award of the Degree of Doctor of Philosophy, is a record of bonafide research carried out by him. He has worked under our guidance and supervision and has fulfilled the requirements for the submission of this thesis, which has attained the standard required for a Ph.D. degree of this Institute. This work has not been submitted elsewhere. for the award of any degree or diploma.



(Dr. Prem Vrat)
Professor
Deptt. of Mech. Engg.
Indian Institute of Technology,
Delhi
New Delhi-110016



(Dr. V. Singh)
Assistant Professor
Deptt. of Mech. Engg.
Indian Institute of Technology,
Delhi
New Delhi-110016

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ABSTRACT

This thesis aims at using a systems approach for modelling the dynamic behaviour of the urban transportation system, for the purpose of planning and policy design. The system dynamics methodology has been employed for developing a computerized transportation planning and policy design simulation model for Delhi urban region. The model will enable the planners and decision makers to foresee the effects of various transportation policies. Because of the complex interrelationship of the transportation system with other urban systems, this will help them in anticipating and minimizing the negative effects caused by transportation activities, like excessive traffic congestion, high fuel consumption and air-pollution, etc.

The literature on transportation planning models has been viewed. The need for a model, based on understanding of the system structure, and incorporating the interactions between urban systems and transportation systems has been brought out. Accordingly, a system dynamics model has been developed which incorporates the interactions between the socio-economic activities of the urban region, the highways, the passenger transportation, the transportation fuel consumption, and the pollution.

Statistics of Delhi urban region have been used to calibrate the model, before exploiting it to carry out a series of policy experiments. Specifically, the model has been used to

investigate policies to reduce petrol consumption and air pollution, to improve the bus level of service, to encourage ride-sharing, to improve mass transit usage and bus corporation's financial condition, to reduce road congestion and to prohibit motorized means of transport through certain congested areas.

The simulation experiment results are compared with the reference run results to study the changes in the relevant variables. Cost implications and implementation strategies for various policies are also discussed.

One of the major conclusions of these policy experiments is that it is not sufficient to raise bus fares in order to increase bus revenues collection-the travel cost by private modes of transport should also be increased by an amount such that the automobile modal split fraction does not go up due to bus fare increase. Other major conclusions and significant research contributions made are also highlighted, and it is hoped that the system dynamics model developed in this thesis along with the simple operating procedure, would aid the urban transportation planners, operating in complex environment, in making effective and constructive decisions. Some of the limitations of the study have been outlined, and scope for further research has been indicated.

A bibliography on transportation planning models, followed by appendices is given at the end of the text.

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