A Network Equilibrium Approach for Simultaneous Estimation of Activity and Travel Choices in Multi-modal Transportation Network

RGC Ref. No. PolyU 5181/13E
Principal Investigator Ir Prof. Lam Hing-keung, William
Funding Scheme General Research Fund
Amount Awarded HK$645,500
Project Duration 3.5 years
Project Status In progress

Research Background

Hong Kong Statistics
- Population: Over 7.25 million
- Total area: 1,104 km², about 24% land developed
- Population density (developed land average): 27,700 persons/km²
  In comparison: Taipei – 9,950 persons/km²; Tokyo – 62,220 persons/km²;
  Bangkok – 5,300 persons/km²
- Road length – 1,200 km
- No. of licensed vehicles = 750,000 (as at February 2017)
- 14 million daily trips, in which ~90% is public transport passenger trips

Achievement of Project Objectives

<table>
<thead>
<tr>
<th>No.</th>
<th>Project Objectives</th>
<th>Research Outcomes</th>
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<tbody>
<tr>
<td>1.</td>
<td>To calibrate the activity and travel choice relationships with the use of the 2011 Travel Characteristics Survey data in order to generate the towers, activity and travel choice patterns</td>
<td>4.5, 6, 7, 11</td>
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<td>2.</td>
<td>To develop an activity-based time-dependent multi-modal transport network equilibrium models with particular consideration of both the activity and travel choices of travelers in congested road and transit networks.</td>
<td>1, 2, 3, 6, 7, 9, 10</td>
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<td>3.</td>
<td>To develop an activity-based network equilibrium model for simulating travel demands by modes and parameter estimation of the activity-travel choice model with and without optional vehicle occupancy costs in the Hong Kong Annual Traffic Census.</td>
<td>4.5</td>
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Research Activities in the Project

In relation to the project objectives 1 and 3, the relationships among home-work-home and home-school-home activity durations and travel times of workers and students were investigated using the 2011 Travel Characteristics Survey (TCS) data in Hong Kong for developing the activity-based models (see Figure 1). In addition, a maximum-likelihood method that uses multiple sources of roadside observations (link counts and/or plate scanning data) was proposed for parameter estimation of activity/travel choice models. Another maximum-likelihood method was also proposed for calibrating individuals' and household's activity-travel scheduling models.

Research Outputs


Collaboration with other Universities

The University of Hong Kong

Research Student Trained

WEPULANON Piyanit (Degree registered: PhD)