Analyses of Travel Demand Variation Considering Users’ Choice Behaviors on Urban Expressway Using ETC Data

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Key words: Drivers’ behavior, ETC, Expressway

Background

- Travel demand and traffic management (TDM) aim to ensure the efficient use of existing roadway system.
- The better knowledge of travel demand enhance the efficient implementations of TDM/ITS strategies.

Limitations of conventional methods:
- Collecting travel information is difficult.
- Usually, based on stated preference (SP) data and small sample size.

Purpose

- To obtain better knowledge of travel demand variation using travel information derived from ETC and available data sources.

Study Sites

- Tokyo metropolitan expressway (MEX)
  - More than 90% of expressway users use ETC system.
  - On Metropolitan Expressway (MEX)
    - Five study areas are selected
    - Based on two major route choices
    - Eight months travel data

Empirical Results

- Derived travel data
  - Route choice
  - Departure time
  - Travel characteristics
  - Level of service information etc.

- Variability is measured by sum-of-square (SS)

\[ TSS = WPSS + BPSS \]

where

\[ S_i^2 \text{: intrapersonal variability by vehicle } i \]

\[ J \text{: Total observation days} \]

Route choice behavior

- Preference of using Route 1 or Route 2
- Define drivers’ main route.
- Preference of switching to alternative route.

Departure time choice behavior

- Define travel time
- A knowledge of travel demand variation is examined in both spatial (route choice) and temporal (departure time) dimension using revealed preference (RP) travel information from ETC and detector data.

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