Chapter 43

Issues in Feathers Application in the Seoul Metropolitan Area

Won Do Lee
Kyung Hee University, Korea

Chang-Hyeon Joh
Kyung Hee University, Korea

Sungjin Cho
Hasselt University, Belgium

Bruno Kochan
Hasselt University, Belgium

ABSTRACT

Over the last decades, the trip-based approach, also known as the four-step model, has been playing an unrivaled role in transportation demand research in Korea. It has been used to predict changes in traffic volume resulting from new transportation policy measures, and also has allowed conducting benefit-cost analyses for new infrastructure provisions. It has been increasingly difficult for the trip-based model to anticipate individual responses to new transportation policy inputs and infrastructure provision as the society becomes personalized and diversified. Activity-Based Modeling (ABM) approaches, predicting travel demand derived from individual activity participations, were introduced to complement the trip-based approach in this regard. The chapter introduces the Seoul ABM project that aims to first apply FEATHERS as an ABM to the data collected in Seoul Metropolitan Area (SMA) and then develop a prototype of the ABM framework for Korea. More specifically, the chapter first briefly describes SMA in comparison with Flanders in Belgium and other countries. It then introduces related research works in Korea and the background of the Seoul ABM project. After these, a FEATHERS framework applied for the Seoul ABM project is described with its data requirements. Major issues of and solutions to the Seoul ABM project are then discussed with regard to the data preprocessing. The chapter ends with a summary and future work.

INTRODUCTION

The trip-based approach, also known as the four-step model (FSM), has been used for transportation demand researches to develop policy measures, such as transportation infrastructure provision, in Korea. It has however been increasingly difficult for the FSM to anticipate individual responses to new transportation policy inputs and infrastructure provision as the society becomes personalized and diversified. The FSM is hard to capture the secondary consequences of social phenomena, such as aging and CO2 emissions, which need to concern the efficiency of transportation system both at the macro and micros (Park et al., 2012). Moreover, the FSM does not take the temporal trip distribution into account and ignores spatio-temporal information about the trip segment.

This chapter introduces an activity-based model (ABM), developed by the Seoul ABM project, to complement the FSM and to better predict travel demand derived from individual activity participations. The Seoul ABM project (Lee et al., 2012) in Korea aims to first analyze individual travel demand in the Seoul Metropolitan Area (SMA) using FEATHERS and to develop a prototype of the ABM framework for Korean context. The chapter therefore focuses on introducing the Seoul ABM project with discussions on issues of and solutions to the data processing. To this end, Section 2 provides an overview of the study area and a comparison between the SMA in Korea and other countries including Flanders in Belgium. Section 3 then reviews related research on transportation demand forecast in Korea. Section 4 details the FEATHERS framework and data requirements. Section 5 addresses major issues of and solutions to the data processing of the Seoul ABM project using FEATHERS. Section 6 concludes the chapter with a summary and the future work.

STUDY AREA

The SMA consists of three local governments, including Seoul, Inchon and Gyeonggi with 23,836,272 inhabitants (49% of the population in Korea). Metropolitan Transportation Authority (MTA) organizes the metropolitan transportation planning, and Korea Transportation Institute (KOTI) collects for MTA the network data from local governments and their institutions. The recent household travel survey was conducted in 2010 in the SMA, to collect household activity-travel data involving 665,801 respondents (2.79% of the population in SMA). Table 1 shows descriptive statistics of the survey data.

Table 1 shows trip frequencies 2.51, time 84.04 in min and distance 13.73 in km on daily average. 31.6% and 31.3% of the trips account for walk and car drivers/passengers, respectively. Public transportation (e.g. bus and metro) use amounts to approximately 30% of the trips, which is higher than most large cities in western countries, likely resulting from the transportation infrastructure and policy measures in the area. Regarding the trip purpose, commuting, except for a private education, is of the highest proportion as 31.3% of the trips. Leisure and shopping take only 3.7% and 2.8%, respectively. This result is concerned likely with the lack of diversity in activities, dominated by work-related activities in the area. Time-use of each activity type therefore confirms its importance in the travel behavior research.

Figure 1 illustrates the temporal distributions of commuters’ trip participation in Korea and other countries. The distributions in Korea and Japan are similar in the morning peak from 6 to 8, while the off-morning peak differs; 6 to 8 in Korea (6 to 8) and 4 to 6 in Japan. U.S. shows peak hours earlier by