

Simulation of competition and cooperation between car-sharing and public  
transportation with Kyoto case study

(カーシェアリングと公共交通の競合と協調に関するシミュレーション研究  
—京都市の事例研究とともに—)

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Abstract

Car-sharing service has been introduced in many cities worldwide, and the emergence of this new travel mode brings changes to the society especially for public transportation (PT). The impact of car-sharing has been a controversial issue as it can bring conveniences but cause congestion at the same time. Therefore, we are aiming to investigate the competition and cooperation between car-sharing and PT, as well as develop suitable network, especially to reduce the travel cost of passengers. In this research, instead of traditional shared vehicles with drivers, we apply relocated shared autonomous vehicles for model simulations on different scenarios with PT networks. Moreover, in addition to distance specific pricing, we apply a new dynamic pricing strategy for car-sharing in the simulation. To discuss about the relation between car-sharing and PT legitimately, we discuss two case studies, one is the hypothetical small network and the other one is Kyoto city. Moreover, the performance of the whole network is evaluated by cost for passengers and profit for car-sharing operator as well as the spatial distribution of car-sharing price and modal share. Results show that if a car-sharing service is introduced in the network, cost for passengers can be decreased, meaning that the car-sharing service can improve traffic network. The case studies illustrate that the benefit of car-sharing service is affected by the location and structure of the PT network. Further, the impact of pricing strategies also varies with features of the city, such as population distribution and city size. Hence, it's necessary for city planners to draw up a proper pricing regulation, in order to balance and maximize the benefits for both passengers and car-sharing operators.