ECOLOGICAL & PROFITABLE CARSHARING BUSINESS: EMISSION LIMITS & HETEROGENEOUS FLEETS

Research paper

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Abstract

Carsharing is a mobility concept that addresses the world’s growing interest in sustainability. It reduces CO₂ emissions, traffic congestion, and noise in cities. Including electric and hybrid vehicles in the car-sharing fleet supports these aspects even more. For a station-based carsharing organization (CSO), the distribution and availability of vehicles play a crucial role to satisfy the customers’ needs as well as to obtain profits. We developed a tactical optimization model to determine the size and composition of a heterogeneous carsharing fleet while considering different emission limits with time-dependent demand profiles. Different propulsion modes and vehicle classes represent the heterogeneity of the fleet. Using the application example of the city of San Francisco, results are presented, discussed, and analyzed. Our benchmarks for two different demand scenarios reveal the strong influence of a preset maximum level of CO₂ emissions on fleet composition and monthly net profit. The optimization model allows CSOs to provide a sustainable and profitable mobility concept; city planners are supported to evaluate influences of CO₂ emission thresholds on CSOs. The model thereby represents a Green IS approach, as it contributes to supporting a society’s path towards a low emission and noise-reduced environment in urban areas where carsharing is feasible.

Keywords: Carsharing, Emission Limits, Decision Support, Green IS.