

INTRODUCTION OF ECO-LANES IN A MEDIUM-SIZED CITY - IMPACT ON EMISSIONS

Tânia Fontes, Paulo Fernandes, Hugo Rodrigues, Jorge Bandeira, Sérgio Pereira, Margarida C. Coelho
Research Group on Transportation Technology of the Centre for Mechanical Technology and Automation (TEMA) /
Department of Mechanical Engineering
University of Aveiro
{trfontes, paulo.fernandes, hugorodrigues, jorgebandeira, sergiopfereira, margarida.coelho}@ua.pt

Asad Khattak
Civil & Environmental Engineering Department
Old Dominion University
akhattak@odu.edu

FCT Project SMARTDECISION - PTDC/SEN-TRA/115117/2009.

This work is part of the research project SMARTDECISION which will run until January 2014. The fundamental goal of this project is to develop a prototype decision support information system that will characterize urban mobility and improve traffic operation at urban and regional level considering different factors such as time, traffic congestion, fuel use, and therefore emissions. Previous authors' research has demonstrated that the route choice plays a key role in reducing emissions. However, innovative traffic management measures are also needed to reduce transportation-related emissions on arterials and freeways. While in Europe, road lane management has focused mainly on introduction of bus lanes, the conversion to High Occupancy Vehicles (HOV) and eco-lanes (lanes dedicated to vehicles running on alternative fuels) has not been studied comprehensively.

Thus, the objectives of this research are to: 1) Develop an integrated microscale modeling platform calibrated with real world data to assess both traffic and emissions impacts of future Traffic Management Strategies (TMS) in an urban area; 2) Evaluate the introduction of eco-lanes in three different types of roads in European medium-sized cities and its effects in terms of emissions and traffic performance.

The methodology consists of three distinct phases: a) Traffic and road inventory data collection, b) Traffic and emissions modeling using an integrated platform of microsimulation, and c) Evaluation of scenarios. For the baseline scenario, the statistical analysis of the integrated platform show valid results, i.e., no significant differences between simulated and Vehicle Specific Power (VSP) modal distributions. Moreover, the methodology applied shows that HOV and eco-lanes in a medium European city are feasible. The results show that on freeways a majority of passengers can reduce their travel time about 5% with a positive impact in terms of total emissions (-3% CO₂, -14% CO, -8% NO_x). On urban arterials, emissions reduction can be achieved only if the average occupancy of vehicles increases from 1.37 (current) to 1.50.

KEYWORDS – INTEGRATED MICROSCALE MODELING, ECO-LANES, HOV, VSP, EMISSIONS

Research Project running from 1st February 2011 to 31st January 2014.