Evaluating the Effectiveness of the Hamburg SmaLa Project in Terms of Traffic-Relevant KPIs

Master‘s Thesis of Ece Zülal Öztok

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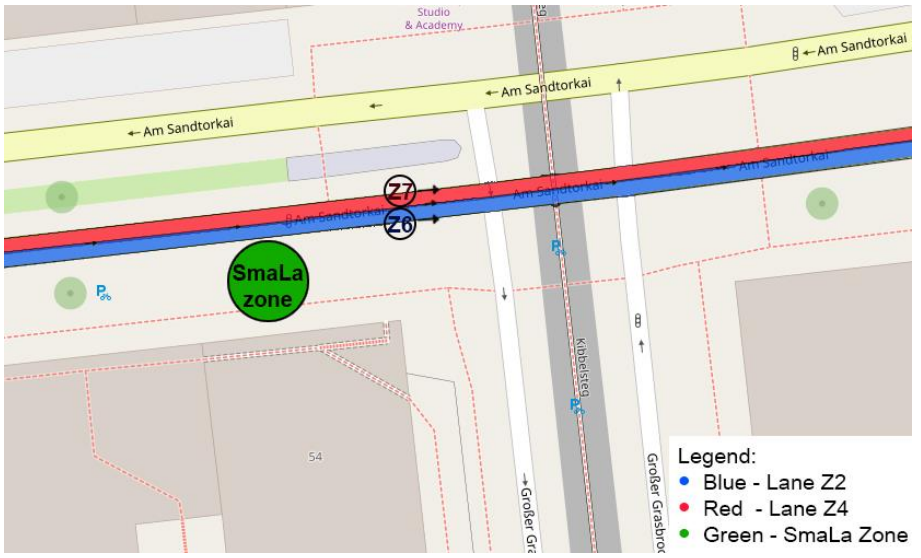
SmaLa concept image (by stadtraum GmbH).

Urban deliveries by courier, express, and parcel (CEP) services have increased in recent years with the rise of e-commerce, intensifying pressure on kerbside space for delivery parking. In cities like Hamburg, this often leads to double parking, which reduces lane capacity, worsens congestion, and raises emissions. The problem is particularly severe in commercial areas where legal loading zones are scarce.

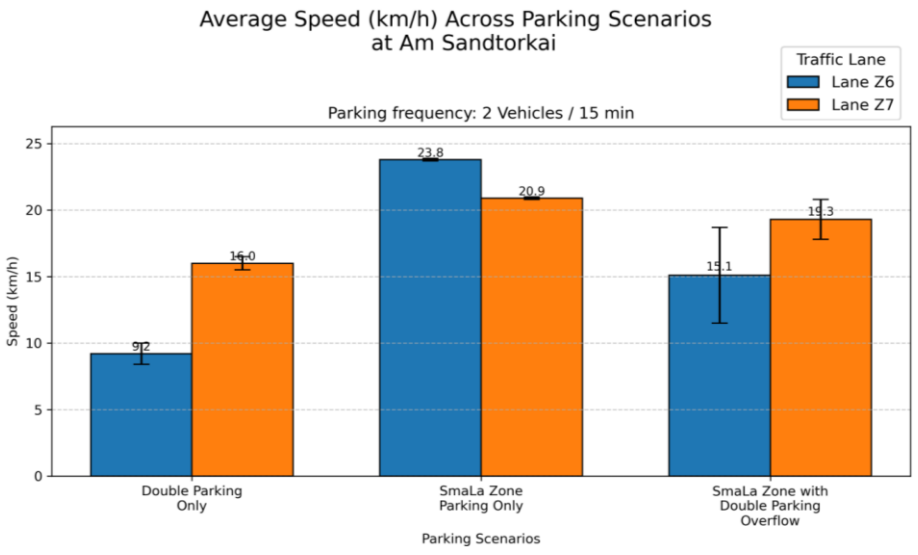
To address this, Hamburg launched the SmaLa project, introducing 20 smart delivery zones with real-time reservation via a mobile app. These zones aim to reduce double parking and improve traffic efficiency. While international studies highlight the benefits of kerbside management, few have evaluated such systems in Germany. This thesis investigates the traffic impact of SmaLa using microsimulation, contributing location-specific evidence on how smart loading zones affect urban mobility.

The traffic effects of Hamburg’s SmaLa zones were assessed through microscopic simulations in SUMO. Two SmaLa locations, Am Sandtorkai and Valentinskamp, were selected due to available data and differing street layouts. Three parking strategies were modelled: double parking only, SmaLa zone parking only, and SmaLa zone parking with double parking permitted when no SmaLa spaces are available. Traffic demand reflected pre-implementation peak-hour counts, and parking durations followed a Weibull-based probabilistic model. Calibration and validation were performed using observed traffic flows, achieving a close match through adjustment of lane-changing parameters.

The study included variations in parking frequency, SmaLa capacity, and traffic volumes. This setup enabled a controlled evaluation of how different parking strategies influence average speed, emissions, and parking outcomes under representative urban traffic conditions.



Map of the study site at Am Sandtorkai, showing traffic lanes and SmaLa zone location. Adapted from OpenStreetMap.



Average speeds for each parking scenario at Am Sandtorkai.

Simulations showed that unregulated double parking consistently reduced traffic speeds and increased emissions, particularly on lanes directly affected by kerbside obstructions. Reserving deliveries exclusively for SmaLa zones maintained the most stable and efficient traffic flow, but limited capacity meant some delivery vehicles were unable to park during peak parking demand. Allowing double parking when the SmaLa zone was full improved parking availability but reintroduced some traffic delays.

Increasing SmaLa capacity improved both accessibility and speeds where overflow double parking was allowed, while traffic performance in the SmaLa-only scenario remained unchanged. Across both locations, dedicated infrastructure reduced CO_2 emissions compared to unregulated parking. The findings suggest that combining smart kerbside management with adequate capacity and enforcement can improve traffic efficiency and reduce environmental impact, while balancing delivery service needs in dense urban areas.