

Planning, Policy and Programming Research

Results



Developing a Vehicle Routing and Facility Location Model to Evaluate Various Last-Mile Strategies and Technologies.

WHAT WAS THE NEED?

To keep up with the growing demands of e-commerce, last mile companies and academics have developed, evaluated, tested, and implemented various last-mile strategies around the world. These include the use of consolidation (e.g., urban consolidation centers, staging areas, delivery hubs) facilities and/or collection strategies (e.g., lockers, pick-up and drop-off centers) coupled with the use of Alternative fuel Delivery Robots (ADRs) and Unmanned Aerial Vehicles (UAVs or drones), and the use of new delivery services (e.g., crowd shipping).

The literature has mostly focused, however, on studying such strategies independently. Research is still needed to understand how these strategies could work under an integrated system.

WHAT WAS OUR GOAL?

We developed a Vehicle Routing and Facility Location model to evaluate last-mile strategies/technologies.

WHAT DID WE DO?

This project aimed to connect space and time decisions to the assessment of different strategies and technologies to quantify traffic impacts over the road network, changes in vehicle-milestraveled displaced by drones, ADRs, or bikes and greenhouse gas emissions.

Completion Date: February 28, 2023 Task Manager: Stuart Mori Associate Transportation Planner stuart.mori@dot.ca.gov

Start Date: January 1, 2022

OCOTBER 2023

Task Number: 3366

Coping with the Rise of

E-Commerce Generated Home Deliveries Through Innovative Last

Mile Technologies and Strategies

Project Title:



DRISI provides solutions and knowledge that improves California's transportation system

ADA Notice: Users with accessibility issues may contact the California Department of Transportation, Division of Research, Innovation and System Information. For TTY assistance, call the California Relay Service at 711, email: pm2.communications@dot.ca.gov or write Caltrans, DRISI – MS-83, P.O. Box 942873 Sacramento, CA 94273-0001



Coping with the Rise of E-Commerce Generated Home Deliveries Through Innovative Last Mile Technologies and Strategies



WHAT WAS THE OUTCOME?

The results suggested that last-mile deliveries using a fleet of electric delivery trucks can make urban freight economically viable, environmentally efficient, and socially equitable compared to diesel trucks. This study also found consolidation facilities and light duty delivery vehicles to be less cost-effective and less resistant to demand uncertainty than other distribution strategies. Finally. the use of ADR and drones from delivery vans saw significant advantages over other strategies.

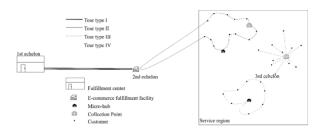
WHAT IS THE BENEFIT?

The findings provide insights to the Caltrans Offices of Freight and Multi-Modal Planning, as well as the Research and Modeling Branches, and are consistent with the California Freight Mobility Plan, the California Transportation Plan (2050), and other important efforts that seek to move goods more effectively and efficiently. These findings also provide insights for e-commerce retailers looking to optimize their last-mile distribution operations and balance sustainability and reliability to cater to a market demanding increasingly customer-focused services.

LEARN MORE

For more details, see the attached report. https://escholarship.org/uc/item/5t76x0kh

IMAGES



The contents of this document reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the California Department of Transportation, the State of California, or the Federal Highway Administration. This document does not constitute a standard, specification, or regulation. No part of this publication should be construed as an endorsement for a commercial product, manufacturer, contractor, or consultant. Any trade names or photos of commercial products appearing in this document are for clarity only.