



Caltrans Division of Research,  
Innovation and System Information

# Research

# Results

Crosscutting

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**Project Title:**

Spatial Dynamics of the Logistics Industry and Implications for Freight Flows

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## Spatial Dynamics of the Logistics Industry and Implications for Freight

Determine whether warehousing and distribution activity has decentralized, or become less concentration in California's large metro areas

### WHAT IS THE NEED?

This project examines changes in the spatial pattern of warehousing and distribution (W&D) activities and analyzes the implications of these changes on freight flows. It is claimed that W&D activities are decentralizing in response to rising land values and scale economies. Ultimately, we seek to understand whether these spatial shifts result in more truck VMT, or whether the efficiencies gained by larger scale operations allow offsetting savings, such as enabling the use of larger trucks or achieving higher average load factors. Understanding how these shifts are affecting truck VMT is essential for developing effective policies for managing truck VMT and their associated emissions. However, there is no good source for tract or zone level truck flow data, or for intra-metropolitan truck origin-destination data.

### WHAT WAS OUR GOAL?

The purpose of the research is to determine whether warehousing and distribution activity has decentralized, or become less concentration in California's large metro areas. If such changes have not occurred, any increases in truck VMT associated with warehousing and distribution cannot be attributed to spatial shifts in warehouse distribution center (WDC) location.

### WHAT DID WE DO?

As a first step we focus on accessibility. From the literature on passenger travel, we know that travel distance is related to accessibility. Thus changes in accessibility to goods markets should be a proxy for goods travel distance, all else equal.



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We examine changes in the spatial pattern of warehousing and distribution activities using zipcode level panel data

(Zipcode Business Patterns, ZBP) for the four largest metro areas in California, from 2003 to 2013.

We have generated a set of measures of decentralization and deconcentration: distance from the CBD, average access to market proxies (population, employment, employment centers), Gini coefficient, and relative concentration. We have applied them to the Los Angeles, San Francisco, Sacramento and San Diego CMSAs.

## WHAT WAS THE OUTCOME?

We examine changes in the spatial pattern of warehousing and distribution activities for the four largest California metropolitan areas: Los Angeles, San Francisco, Sacramento, and San Diego, using ZIP Code Business Patterns data for 2003 and 2013. Measures of decentralization and concentration were then developed.

The results were mixed. When using establishment counts, only Los Angeles shows a consistent pattern of decentralization. There is more evidence of decentralization when using employment counts, which is consistent with larger scale facilities being built at the periphery. Spatial patterns for the largest metro areas are quite different from those of the smaller metro areas. Higher development density and associated land prices seem to push W&D activity to more distant areas. In contrast, W&D location in San Diego and Sacramento is relatively closer to employment, population, and the CBD. If all truck traffic were local, our results suggest possible increases in truck VMT, particularly for the largest metro areas. However, more than half of all commodity flows is non-local. The decentralization we observe is

likely related to domestic and international trade, for which access to local markets is less important. More research is necessary to determine whether decentralization is a consistent trend in large metro areas, and, if so, whether impacts on truck VMT within metro areas is positive or negative.

## WHAT IS THE BENEFIT?

We seek to understand whether these spatial shifts result in more truck VMT, or whether the efficiencies gained by larger scale operations allow offsetting savings, such as enabling the use of larger trucks or achieving higher average load factors. Understanding how these shifts are affecting truck VMT is essential for developing effective policies for managing truck VMT and their associated emissions.