

## Out-of-town shopping and its induced CO<sub>2</sub>-emissions

### Abstract

Planning policies in several European countries have aimed at hindering the expansion of out-of-town shopping centers. One argument for this is concern for the increase in transport and a resulting increase in environmental externalities such as CO<sub>2</sub>-emissions. This concern is weakly founded in science as few studies have attempted to measure CO<sub>2</sub>-emissions of shopping trips as a function of the location of the shopping centers. In this paper we conduct a counter-factual analysis comparing downtown, edge-of-town and out-of-town shopping. In this comparison we use GPS to track 250 consumers over a time-span of two months in a Swedish region. The GPS-data enters the Oguchi's formula to obtain shopping trip-specific CO<sub>2</sub>-emissions. We find that consumers' out-of-town shopping would generate an excess of 60 per cent CO<sub>2</sub>-emissions whereas downtown and edge-of-town shopping centers are comparable.

Keywords: Car-specific CO<sub>2</sub>-emissions; Counter-factual; Dense network; GPS tracking; Regional shopping centers

[Which is about to appear in Journal of Retailing and Consumer Services.](#)

[Given time, I might also present:](#)

### An empirical test of the gravity $p$ -median model

A customer is presumed to gravitate to a facility by the distance to it and the attractiveness of it. However regarding the location of the facility, the presumption is that the customer opts for the shortest route to the nearest facility. This paradox was recently solved by the introduction of the gravity  $p$ -median model. The model is yet to be implemented and tested empirically. We implemented the model in an empirical problem of locating locksmiths, vehicle inspections, and retail stores of vehicle spare-parts, and we compared the solutions with those of the  $p$ -median model. We found the gravity  $p$ -median model to be of limited use for the problem of locating facilities as it either gives solutions similar to the  $p$ -median model, or it gives unstable solutions due to a non-concave objective function.

The screenshot shows the pimcore administration interface. On the left is a file browser showing a tree structure under 'Documents'. The main area contains a toolbar with options like 'Save & Publish', 'Unpublish', 'Delete', 'Reload', 'Show in Tree', and 'Dependencies'. A 'Link' dialog box is open in the center, with tabs for 'Link Info', 'Target', and 'Advanced'. The 'Link Info' tab is active, showing 'Link Type' as 'URL' and 'Protocol' as 'http://'. There is an input field for the 'URL' and 'OK'/'Cancel' buttons at the bottom.

**Link**

Link Info Target Advanced

Link Type  
URL

Protocol  
http://

URL

OK Cancel