Evaluating Crowdsourcing as a VMT Reduction Tool to Support Smart Cities Initiatives

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Transportation activity is an important indicator of economic growth and prosperity of a city. In our society, various modes of transportation, such as passenger cars, transit busses, and rails fulfill the needs of millions of consumers. In order to meet these needs of the people, we commonly utilize vehicles that rely on fossil fuels, thereby causing an increase in emissions and air pollution. Scientists observe these emissions in concentrated amounts, especially at large crowd gatherings and locations that experience high vehicular traffic volumes. Examples of such locations are parking lots of high density commercial, residential, and industrial locations. This research tests the hypothesis that a crowd of campus drivers can be used to mitigate emissions generated at parking lots. In addition, the mitigation efforts can become highly effective with advance information relayed to drivers on parking occupancies.

Study Methods

In this study, researchers employed crowdsourcing as a tool to test whether individual driving patterns can be altered with cues from advance parking problems. In fulfilling the objectives of this research, the research team collected parking information across CSULB campus lots. The team collected parking availabilities on random days of the week from Monday to Friday and at random times between 8 am to 7 pm during, initially, one month of Fall 2019. Researchers wanted to achieve an estimate of parking availabilities from 8 am to 7 pm on a typical day of the week – Monday through Friday. In addition, during this first one month, data collection consisted of determining the prevailing modes and time of travel of 55 CSULB student participants using an app developed for this research. At the commencement of this part of data collection effort, researchers enabled advance parking information in the app for the next

one-month study. Before heading to the campus, the participants were asked to review parking availability on campus using the app. Researchers tracked the location of each participant during their travel to the CSULB campus. If the mode choice was a car, researchers recorded ease of parking consisting of drive times in a lot- which they ultimately used to update the master file on availability status of parking in real time. Thus, the master file on travel data was made dynamic. Finally, researchers recorded the travel data for each participant for the one-month period.

Crowdsourcing parking availability in-advance can reduce unnecessary vehicular driving and emissions at parking lots.

Findings

Analysis of the travel data of the participants showed that car usage was found to be the highest, followed by the transit bus and other modes used to reach the campus. An analysis carried out 'before' and 'after' introducing the smartphone application among participants showed that car driving to campus reduced and there was subsequent increase in transit usage. Overall, the study revealed a net percentage reduction in vehicle miles travelled (VMT), as noted in Table 1.

Table 1. Percentage VMT reduction

Day of the Week	VMT reduction with car	VMT reduction with bus
Monday	3%	2%
Tuesday	0%	1%
Wednesday	2%	1%
Thursday	4%	5%
Friday	0%	0

Policy/Practice Recommendations

This research shows a promising use of crowdsourcing aiding in smart city initiatives through VMT reductions in a community. One of the main limitations of this research was the limited number of participants who were not provided

any incentive after study completion. Large-scale implementation of this research is needed to fully realize the utility of crowdsourcing in campus wide VMT reduction strategies and addressing climate change goals of stakeholders.

About the Authors

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To Learn More

For more details about the study, download the full report at transweb.sjsu.edu/research/1930.

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