



PRESS RELEASE

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Large benefits would occur from trip aggregation

It is possible to achieve large environmental, health, and economic benefits by effectively aggregating trips in urban areas. Trips could be aggregated into public taxi-like vehicles in a cost-effective way, and this transport mode could handle a large proportion of the whole personal traffic in urban areas. This is despite many current car-owners would be reluctant to use the new transport.

This conclusion was reached in a study published by a research group from the National Public Health Institute (KTL) in Finland. The leader of the group is Academy researcher **Jouni Tuomisto**. The study is the first of its kind, and it shows that a very large-scale demand-responsive public transport has large potential benefits. The system is worth to be studied further and tested in practice.

In the Helsinki metropolitan area, there are dozens of estimated premature deaths per year due to fine particles from private cars, and car accidents kill about twenty. In addition to public health problems, private car traffic causes congestion, carbon dioxide and other greenhouse gas emissions, and high costs from vehicle fuel and maintenance.

Tuomisto's research group studied the costs of a so-called composite traffic based on real trip and cost data from the Helsinki area. The results were promising: many burdens, such as carbon dioxide emissions or parking place need, were reduced by even 50 to 70 % compared with private car traffic. In addition, the costs of composite traffic were comparable to those of private cars even without direct subsidies. The cost of an average composite trip was 2.9 euros when the default model assumptions were used. Busses are cheaper and taxis more expensive, but the costs of private cars are in the same range.

Composite traffic is a theoretical transport mode that is based on large demand-responsive public transport. It was designed to replace private car traffic. In this system, passengers send their origin, destination, and time information to a centralised system that combines similar trips into vehicles of either eight or four passenger seats. The vehicle picks a passenger up from the requested place, and the information about the trip is sent to the passenger's mobile phone. The basic idea was to study a transport system that would be in the same class of flexibility and service as the private car.

The study did not evaluate the practical issues of the proposed system. Thus, it did not estimate the real willingness of people to use the system, only the costs that would occur at different situations. We did not prove that passengers would be interested in composite traffic,

only that they should be, explains Tuomisto. Decision-makers should also be interested. If the system grew as large as was anticipated in the study, traffic jams and parking problems would be history.

The study was performed in the National Public Health Institute (KTL) in the Centre for Environmental Health Risk Analysis in Kuopio. It was funded by the Academy of Finland and the National Technology Agency of Finland. It was published in an open access journal BMC Public Health on 25th November 2005.

Background

Composite traffic does not include any major technological innovation, as all its components have been used in small-scale studies in practice. The novelty of the study is the size of the studied transport system. When researchers talk about large-scale demand-responsive systems, they usually mean about a million trips per year. The published study was assessing a half million trips per day. The new scale has brought forward completely new possibilities and cost savings, which have not been anticipated or hoped for before, says Academy researcher Jouni Tuomisto.

Trip aggregation is an undervalued research area, although it is in principle a simple and effective way to reduce the burden of traffic, says Tuomisto. There are a few important reasons for this. In some cases, the experiences from small-scale trials have not been promising. However, also positive results have been obtained from cases where society has paid for the trips. Thus, trip aggregation has brought immediate cash savings.

However, prejudice seems to be an even more important hindrance to research. The research team has heard almost without exception that large-scale composite traffic cannot work in practice. Car drivers are reputedly so set in their ways that they refuse to leave their car in the garage.

This argument became a major research question in the study. The research group took the car drivers' reluctance into account in their model, and got two apparently surprising results. First, composite traffic could work cost-effectively even when a large proportion of car drivers were assumed to dislike the system. Second, the model was able to predict the high costs and poor attractiveness to car drivers in real-life pilot studies. Despite this, the model showed that composite traffic would be a viable system.

It is about mass effect, explains Tuomisto. If traffic flow is small, trip aggregation is not efficient and the service is not as good as passengers expect. The key issue is to be able to handle a large amount of trips and expand the system beyond this "inefficiency bump". After that, the unit costs of trips decrease as the system grows, and it becomes more and more profitable.

The decrease of unit costs after certain limit was a robust result and it was seen after very different assumptions. For example, this was true even with small geographical areas. Thus, the system can start cost-effectively in a limited areas within an urban area, and expand gradually. This is a good news for those who are concerned about operational risks of the system.

What about reluctant car drivers? Composite traffic is not intended to rely on their support, says Tuomisto. The relevant people are those drivers who find the system attractive.

Based on the data used in the model, it seems that they might compose almost a half of current car drivers.

It would require large subsidies or driving restrictions to make the reluctant half to use composite traffic. It would be difficult, but fortunately it is not necessary in developing the system, concludes Tuomisto. And even better: the reductions in traffic jams, air pollution, and parking problems benefit all people travelling in urban areas.

Additional information

Academy researcher Jouni Tuomisto

phone +358-17-201305

email jouni.tuomisto @ktl.fi

researcher Marko Tainio

phone +358-17-201162 (not reachable over phone on 2-9 Dec)

email marko.tainio @ktl.fi

Web page of the research group: <http://www.ktl.fi/risk>

Web page of the journal that published the article:
<http://www.biomedcentral.com/1471-2458/5/123/abstract>

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