NewCompactism Report Summary

Project ID: 298657
Funded under: FP7-PEOPLE
Country: Netherlands

Final Report Summary - NEWCOMPACTISM (New Urbanism vs Compact City: Investigation of the relationships between urban micro- and macro- scale effects on travel behaviour)

1.1 Research objectives and completed tasks

Growing urban sprawl means longer car trips and this affects the sustainability of cities. Planning interventions in urban form (e.g. new urbanism, compact city) have been suggested as a possible way to reduce vehicle use. Research in this area falls along a spectrum from total focus on the local spatial scale to total focus on the regional spatial scale, with most studies falling somewhere in between. The studies that focus more on the local scale argue that intervention in urban micro-scale characteristics—such as road network structure and form, bicycle and pedestrian infrastructures, urban furniture, neighbourhood-level density and local accessibility—can reduce private vehicle use and increase the use of alternative means of transport. The studies that focus more on the regional scale contend that increasing the overall density of the city, reducing the distances from dominant centres, mixing land uses, and avoiding large-scale mono-functional areas are associated with more sustainable travel choices. However, interventions at the local scale seem to have limited potential to affect a significant share of private vehicle usage because the destinations for many trips are beyond the travellers’ neighbourhoods. By contrast, regional-scale interventions, which might create the conditions for reducing the length and volume of vehicle trips, are frequently accompanied by side effects (such as congestion and local environmental degradation) that affect cities with limited infrastructure for alternative modes of transport, in particular.

The Marie Curie project ‘New Compactism’ aims to explore the respective roles of local and regional characteristics of urban form on vehicle travel. The main hypothesis of this research is that urban micro- and macro-scale characteristics exert complementary effects on vehicle trip frequency and vehicle kilometres travelled (VKT). We explore our hypothesis in two case studies in different spatial contexts: the San Francisco Bay Area in the US and the Randstad area in the Netherlands.

1.2 Hypotheses, methods and main results

The main hypothesis of this research is that urban micro- and macro-scale characteristics exert complementary effects on vehicle trip frequency and VKT. We assume that the complementarity between the effects of the two urban scales results from the existence of two action spaces that individuals consider when they make travel decisions: (a) the local (multimodal) action space, which is defined as the area that the typical walking, bicycle and public transport user can reach within acceptable travel time for a one-way trip, and (b) the regional (mono- or oligo-modal) action space, which complements the local action space and is dominated by automobiles. The underlying assumption is that people consider an acceptable travel time to spend on each trip they want to make, a factor that is incorporated in their travel decision processes. The results from 36 in-depth interviews conducted in Berkeley, CA and Delft, NL as part of this research, support the validity of the concept of acceptable travel time. A normative travel time threshold is likely to be taken into consideration when people make travel decisions. We expect the acceptable travel time to vary (a) in relation to the distribution and density of destinations (derived utility function) and (b) in relation to individuals’ perceptions, feelings and attitudes about their travel (intrinsic utility function) (see figure 1).
Thus, our “complementarity” hypothesis can be viewed as two sub-hypotheses:

H1: Vehicle trip frequency and VKT (for work, shopping, and social/recreation purposes) within local action space are mainly affected by urban micro-scale characteristics and less affected by urban macro-scale characteristics.

H2: Vehicle trip frequency and VKT (for work, shopping, and social/recreation purposes) outside of local action space are mainly affected by urban macro-scale characteristics and less affected by urban micro-scale characteristics.

The hypotheses were tested in two case studies: the San Francisco Bay Area in the US and the Randstad area in the Netherlands. Two measures of individuals’ travel behaviour were employed in both case studies: VKT and vehicle trip frequency for three trip purposes (work, shopping, social/recreation). The explanatory variables were divided into three groups (socio-economic, urban micro-scale, and urban macro-scale). The network distance of household to CBD and distance to the nearest secondary centre, along with urban activity (sum of net population and employment density), jobs-housing balance and regional-scale jobs accessibility, were used as major indicators for urban macro-scale characteristics. Node density, block size, urban activity, jobs accessibility and local-scale jobs-housing balance were used as major indicators for urban micro-scale characteristics. Household income, size, and number of vehicles, along with age and gender, comprised the socio-economic variables. Given the nested structure of the data, H1 and H2 for VKT were tested using a system of two multilevel models (MLM). The frequency of vehicle trips at a disaggregate level is a discrete ordered choice and was therefore represented by an ordered logit model (ORL).

According to our results, the built environment variables appear to mostly affect VKT and to a much lesser extent the vehicle trip frequency in the case of the San Francisco Bay Area, while in the case of the Randstad area the built environment variables appear to exert only modest effects on both VKT and vehicle trip frequency. However, the complementarity hypothesis was confirmed in both case studies for VKT but not for vehicle trip frequency, regarding both work and shopping trips. That is, urban micro-scale descriptors were more important for explaining VKT in the local action space models, whereas macro-scale descriptors better explained VKT in the regional action space models. The hypothesis was not confirmed for social/recreation trips. Consistent with previous studies, increased node density and block size and, consequently, area connectivity, and increased regional jobs accessibility, were associated with lower VKT.

However, which of the two scales contributes more to the potential decrease of VKT? To answer this question, we should take into account that people in both the San Francisco Bay Area and the Randstad area display significantly lower VKT (per person) in the local than in the regional action space, at a ratio of 1:5.7 (1:5.0 in the Randstad area) for work trips, 1:4.3 (1:4.9 in the Randstad area) for shopping trips and 1:5.5 in both areas for social/recreation trips. This lower VKT means that regional-scale interventions can contribute more to the policy target of VKT reduction, although local-scale design policies can also help reach this target in the framework of a synergistic and integrated approach. Thus, evidence from this research suggests that we promote planning on both spatial scales, though with priority to the regional level to make VKT reduction policies more effective.

**Related information**

<table>
<thead>
<tr>
<th>Result In Brief</th>
<th>Planning transport solutions for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Documents and Publications</td>
<td>final1-publishable-summary-figure-1.pdf</td>
</tr>
</tbody>
</table>

**Reported by**

TECHNISCHE UNIVERSITEIT DELFT
Netherlands