Land use/transport interaction models post Covid-19

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Background

- I never developed a LUTI model
- Heavily involved in strategic policy making in the Netherlands (transport and land use)
- Much interest in wants and needs of policy makers and decision makers and the input of researchers they need
- Chair of committee advising on the future of the Dutch LUTI model
Outline

1. Conclusions
2. Introduction
3. Underpinnings of conclusion
4. Policy implications
5. Summary of implications for LUTI models
1. **Conclusion:**

1. **Needed:** new LUTI models, for trends like:
   - peak car
   - decline (population, shops, services, …)
   - the impact of ICT on activity patterns and travel
   - cycling trends and policies
   - AVs
   - COVID19? (and maybe more)

2. **Lack of empirical evidence:** what-if – change parameters (Michael Wegener, lecture last week)
2. Introduction

LUTI models traditional focus: growth. More people, households, offices / work areas, commercial areas.
Common trends raising need for LUTI models:

• Not more residential, commercial, work areas, but adaptations within current system (EU, Japan, some areas USA, ....)

• Linked to many changing policy questions (redevelopment, social exclusion, stop PT services)

• Asymmetry in effects: growth versus decline (sunk costs, behavioural aspects)
However:

- Future of trends: uncertain
- Lack in empirical research: dynamics in these trends, and their wider impacts on the land use and transport system

Therefore:

*What-if*
Also needed:

• In addition to insights in travel behaviour: wider set of accessibility indicators (Handy, 2020)
  • potential accessibility (incl. ICT?)
  • possibilities for activity patterns
  • Desaggregations (groups of people, areas: fairness)
• Logsum: valuation
• Substitutability?
• interactions between key actors in the transport and land use system (serious gaming)
• dynamic visualisations
Much also relevant for conventional transport models
3. Underpinnings: trends
Peak car:
• Partly: fuel prices, economy (Bastian et al., 2016)
• Not only Crisis
• Parameters homogeneous groups of people probably not stable
• Trends uncertain

(e.g. Special Issue Transport Reviews, 2013, Goodwin and van Dender, eds.)

LUTI: less impact of roads on land use? What-if: parameters
Demography
Less growth, decline, regional heterogeneity

Example national: Japan. Regional variation: France (social exclusion)

**LUTI**: from growth to decline
Sunk costs
Behaviour: not symmetric (e.g. income: Dargay, 2001; Wadud, 2014)

ICTs impact on activity patterns (working, changing shopping behaviour, e-learning)

- Substitution, complementarity, fragmentation
- Results in past applicable to future, in case of ‘much better ICT’?
- Maybe dichotomy: social activities – proximity, other modes than car; utilitarian trips: more substitution ICT
- ICT to reduce social exclusion?
• Less traditional shops? Inner city dynamics? ‘Shops’ for information, advise, ‘seeing and feeling’. Buying: online. Then: no need to transport goods – less car use? Less impact of car accessibility on locations of shops?

• LUTI: too uncertain? What-if at best …
Electric mobility

- E-bikes, E-cars
- Range (bikes: +, cars -)
- Difference in consumers – early adopters versus others
Technology Adoption Life Cycle

- **Innovators**: 2.5%
- **Early Adopters**: 13.5%
- **Early Majority**: 34%
- **Late Majority**: 34%
- **Laggards**: 16%
Electric mobility (continued)

• Mode choice / substitution
• Generation
• Policies (e.g. restrictions, or separate lanes)

LUTI: area specific?
Revival bicycle

Los Angeles, New York, Davis, Boulder, Paris, Lille, Germany, .... (Pucher and Bueeler, 2012; new book forthcoming)

- Proximity
- Quality of urban environment
- Indirect effect: policies – reallocation of space

LUTI: short distances, active modes/cycling

Autonomous Vehicles

• Spatial implications, area specific. Highly uncertain (Milakis et al., 2018)
• More car orientend: increasing importance roads on land use?
• Travel time counts less: less impact roads on land use

Again: unclear. What-if

COVID19

- Long enough to change habitual behaviour (Prof Hayashi)
- Attitude changes (Van Wee et al., 2019)
- LUTI models: very uncertain. What-if

4. Policy relevance

• Redevelopment urban areas – interaction LU-T
• Implications of population decline. Market or interventions? Which interventions? Other destinations for offices? Which offices, where?
• Equity – social exclusion
• Infrastructure policies: are extensions ‘no regret’?
• Closures of PT (lines, stations / stops). Interventions or not? Which?
• Interaction between questions / topics
What do clients of LUTI model applications want and need?

- What?
- Which form (video, presentation, report, ...)?
- Individual, group presentation, discussions, ...?

- Important to understand – multi stakeholder decision making
How to deal with uncertainty

• External (economy, demograph, technology, …): scenarios
• Model structure: limited but relevant. See debates residential self-selection (Cao, Moktharian, Heinen, ..)
• Mathematical formula (linear, S-shaped, convex, ….): limited?
• Data/coefficients: large! Limited options for transerability fo models

My idea (changed): modellers explore many options, but communicate only under which conditions major policy implications would be different
5. Summary of implications for LUTI models

- **What-if calculations**
- **Accessibility indicators / how to model accessibility for which research or policy question?**
- The role of key actors
- Combining LUTI and Expert Judgement
- Output, visualization
Other challenges LUTI models: conceptualization land use and transport interaction

Lopes, A.S., Loureiro, C.F.G., Van Wee, B. (2019), LUTI operational models review based on the proposition of an a priori ALUTI conceptual model. Transport Reviews 39(2) 204-225
• Maybe combine land use, transport, activity based modelling?
• Conceptually attractive
• Progress in ABM far enough?
• Data problems will be reduced, other barriers exist
Thank you!