University of Groningen

Towards a negotiation model for rural mobility hub development

Rongen, Tibor; Tillema, Taede; Lenferink, Sander; Arts, Jos

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Publication date:
2021

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA):
Rongen, T., Tillema, T., Lenferink, S., & Arts, J. (2021). *Towards a negotiation model for rural mobility hub development: Using an exemperimental game-theoretic approach*.

Copyright
Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment.

Take-down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): http://www.rug.nl/research/portal. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Download date: 03-12-2022

Towards a negotiation model for rural mobility hub development

Using an exemperimental game-theoretic approach

T. Rongen; T. Tillema; S. Lenferink; J. Arts

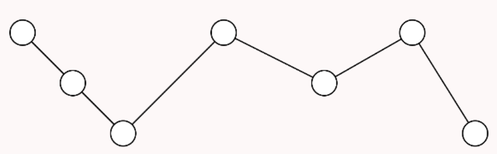
rijksuniversiteit groningen / faculteit ruimtelijke wetenschappen / transportgeografie

Background

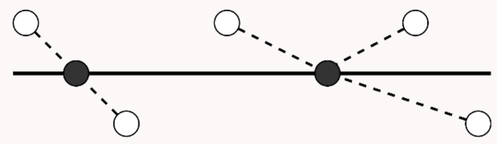
- Peripheral areas lack critical demand for operating close-meshed public transport (PT) systems, resulting in high car dependency levels and transport poverty (Pucher & Renne, 2005). Important drivers behind high car dependency in these areas involve a lack of PT service availability, the indirect routing, and travel inconvenience (Velaga et al., 2012).

- Rural hubs are regional nodes located in rural contexts linking fixed public transit (e.g. BRT) to feeder transport (e.g. shared modes or demand-responsive transit (DRT). Through bundling transport flows in areas with limited and dispersed public transport demand, this trunk-feeder system enables a cost-efficient alternative to a linear system with full geographical coverage. Moreover, in terms of liveability, the hub-generated traffic can consolidate the viability of (public) facilities in areas suffering from demographic decline. Vice versa, coupling existing facilities to the hub, adds travel comfort against low cost. Despite these advantages, the introduction of rural hubs inevitably leads to extra transfers, to larger catchment areas per stop, and thus to longer travel times and distances to and from the hub.

Direct/linear routing



Trunk-and-feeder



References

Falk, A., & Heckman, J. J. (2009). Lab Experiments Are a Major Source of Knowledge in the Social Sciences. *Science*.

Heres, D. R., Kallbekken, S., & Galarraga, I. (2017). The Role of Budgetary Information in the Preference for Externality-Correcting Subsidies over Taxes: A Lab Experiment on Public Support. *Environmental and Resource Economics*, *66*(1), 1–15.

Levitt, S. D., & List, J. A. (2007). What Do Laboratory Experiments Measuring Social Preferences Reveal About the Real World? *Journal of Economic Perspectives*, *21*(2), 153–174.

Pucher, J., & Renne, J. L. (2005). Rural mobility and mode choice: Evidence from the 2001 National Household Travel Survey. *Transportation*, *32*(2), 165–186.

Velaga, N., Nelson, J., Wright, S., & Farrington, J. (2012). The Potential Role of Flexible Transport Services in Enhancing Rural Public Transport Provision. *Journal of Public Transportation*, *15*(1), 111–131.

#1 Understandings of the mobility hub concept

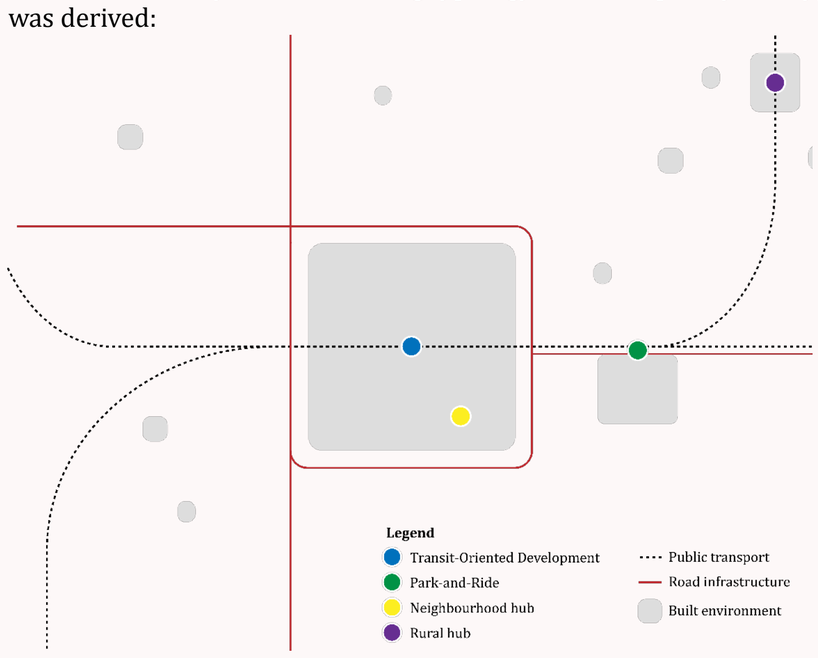
Research objectives
- Provide an overview of the historical and contemporary understandings of the hub concept in The Netherlands

Methods and data
- Historical analysis of national policy documents (1958-2020)
- Semi-structured expert interviews on historical (n=6) and contemporary (n=6) practices

Drivers of the contemporary concept
- *Shared mobility* provides additional transport modes to the hub, enabling a shift from vehicle ownership to use.
- *Mobility as a service (MaaS)* provides the digital integration of multimodal transport supply transport mode supply offered at the physical transfer hub.
- Hubs can be strategic locations for *Electric Vehicle (EV) charging infrastructure*, given the key role of electrification of in the transport system's transition from fossil to renewable fuels.
- Link DRT and PT

Typology

Based on the analysis, the following typology of contemporary hub types was derived:



Research agenda
- Under which conditions can decentralised governance structures be improved to stimulate the development of hubs?
- What is the effectiveness of flanking policies (e.g. parking, road pricing, subsidies)?
- How can market parties be enticed with hub development at rural hubs?

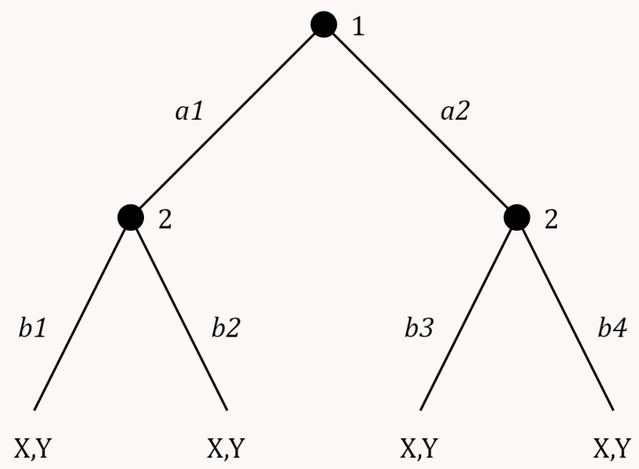
#2 Negotiating rural hub development *[working paper]*

Research question
- How do stakeholders negotiate during the development process of a rural mobility hub?

Non-cooperative game theoretical experiment
- Outcome depends on the *interaction between agents* with different preferences
- Causal effects of actor decisions can be *decoupled from* complex (and long-term) *institutional processes* (Heres et al., 2017)
- Determining the action *order* and *timing* of information provision (Falk & Heckman, 2009)
- *Extrapolate findings* to alternative contexts (Levitt & List, 2007)

Representative players in the game
- Transport authority
- Land-use authority
- Public transport company
- Shared mobility provider
- User (proxy)

Methodological steps and data
1. Exploration of the institutional context (1,2)
   - Which service attributes are to be negotiated at a rural hub?
   - Literature review + stakeholder interviews
2. Game tree construction experiment (a1,...,b4)
   - Which alternative actions can be validated by the players?
   - Fuzzy Delphi (n ≈ 100)
3. Validation of game tree and estimation of possible solutions (X,Y)
   - Which utility do players assign to different outcomes of the game?
   - Focus groups



Q1

The hub model improves the speed and frequency of the service, but concedes on additional transfer disutility, wider catchment areas of public transport hubs and thus longer travel time and distances in the first-and-last-mile.

What is a desirable balance between fixed lines and flexible services?

Q2

Rural areas are characterised by a low and widespread transport demand, making the potential of cost coverage of shared mobility services lower than in urban areas.

What business cases are possible to run viable shared mobility initiatives in rural areas?

Q3

Some authors suggest that combining fixed PT and shared mobility will result in competitive rather complementary dynamics.

What forms of market organisation by governments are desirable in the introduction of shared mobility to prevent from competitive erosion?

Q4

A well-known criticism is the supply-driven approach to transport planning by policy-makers, while (partially) ignoring traveller preferences.

What are the most important service attributes of multimodal travel via hubs to entice the traveller to use this system?