

# Preferences towards Bus Alternatives in Rural Areas of the Netherlands: a Stated Choice Experiment

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# Research summary

- Preferences of rural bus users for:
  1. Traditional bus service
  2. Express bus + bike-sharing
  3. Demand Responsive Transport (DRT)
- Method:
  - Stated preference survey
- Conclusion:
  - Traditional bus most popular
  - Time and costs

# Introduction

- Public transport under pressure in low demand and rural areas
- Are flexible and on-demand services an alternative?
  - DRT
    - Offers flexibility and convenience (Alonso-González, Liu, van Oort, and Hoogendoorn, 2018)
  - Express-bus + bike-sharing
    - Powerful combination: Longer distance & door-to-door accessibility (Kager, Bertolini, and Brömmelstroet, 2016)

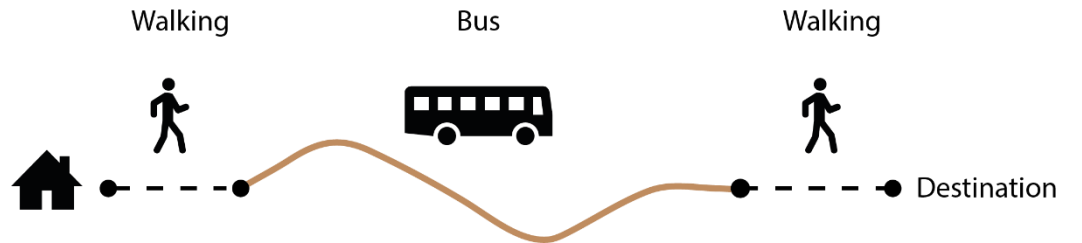
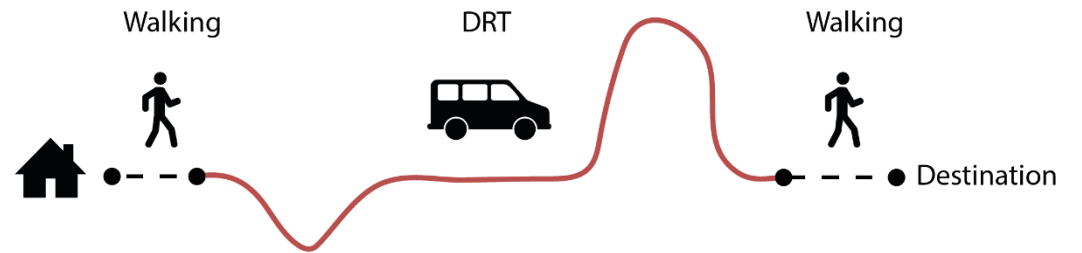
# Research approach

- Method:
  - Stated preference survey
  - Rural bus users in the Netherlands



# Study design

- Alternatives:












# Study design

- Choice context:
  - Most common travel purpose of respondent (leisure/commuting/etc.)
  - Home as origin
  - “Ideal” travel circumstances:
    - No heavy luggage
    - No rainfall
    - 16°C (61°F)

# Study design

- Choice situation:

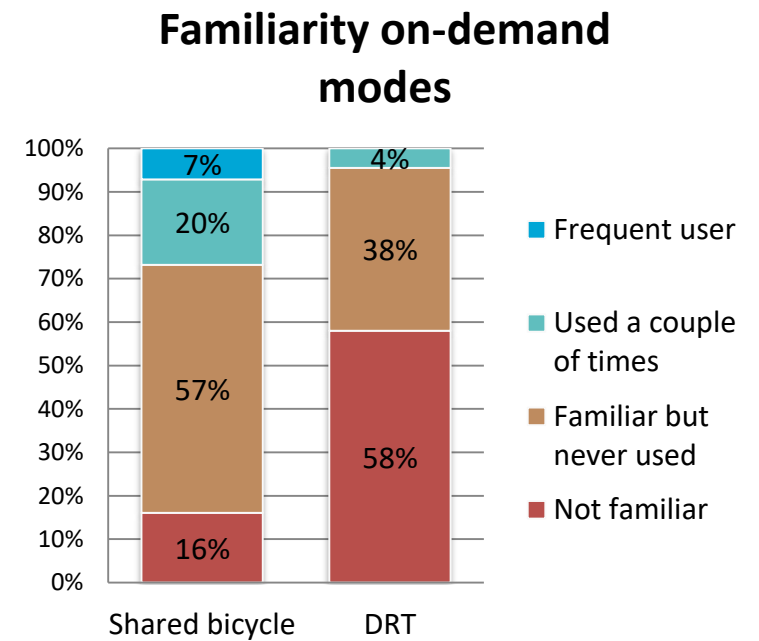
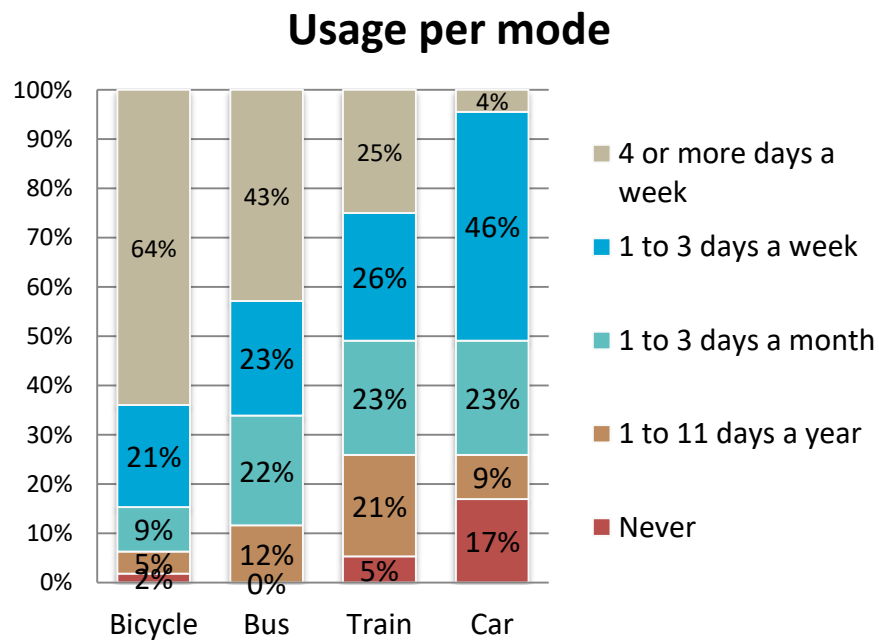
Characteristics	Express bus + bike-sharing 	DRT 	Bus 
<b>Total planned travel time</b>	<b>39 min.</b>	<b>32 min.</b>	<b>45 min.</b>
<b>Of which:</b>			
- To stop	<b>10 min. walking</b> 	<b>4 min. walking</b> 	<b>4 min. walking</b> 
- In vehicle	<b>22 min.</b>	<b>24 min.</b>	<b>37 min.</b>
- To destination	<b>7 min. cycling</b> 	<b>4 min. walking</b> 	<b>4 min. walking</b> 
<b>Frequency</b>	Every <b>60 min.</b>		Every <b>60 min.</b>
<b>Minimum booking time</b>	--	<b>10 min.</b>	--
<b>Number of bicycles available</b>	<b>6</b>	--	--
<b>Departure delay</b>	--	0 to <b>15 min.</b> delay	--
<b>Travel time deviation</b>	--	0 to <b>6 min.</b> delay	--
<b>Cost</b>	<b>€1,50</b>	<b>€5,50</b>	<b>€3,00</b>

Choice:



# Sample characteristics

- 112 valid responses
- Representative for rural bus users





# Results

- Values of travel time savings

Value of travel time savings	DRT	Express bus + bike-sharing
In-vehicle travel time	15.29 €/hour	12.08 €/hour
Access and egress time	25.10 €/hour	
Egress time (bike-sharing)		20.85 €/hour
Access time (walking)		16.48 €/hour

# Results

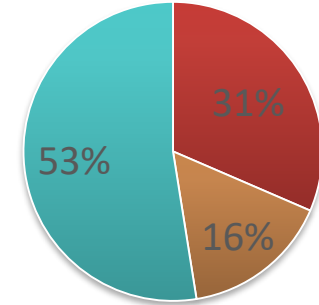
- Personal characteristics that influence preference for alternatives:

Express bus + bike-sharing	DRT
	- Male
++ 15-29 years old	+ 15-29 years old
+ 30-59 years old	
+ Driving licence	+ Driving licence

# Model application

- Sensitivity analysis
- Modal splits

Modal split reference scenario

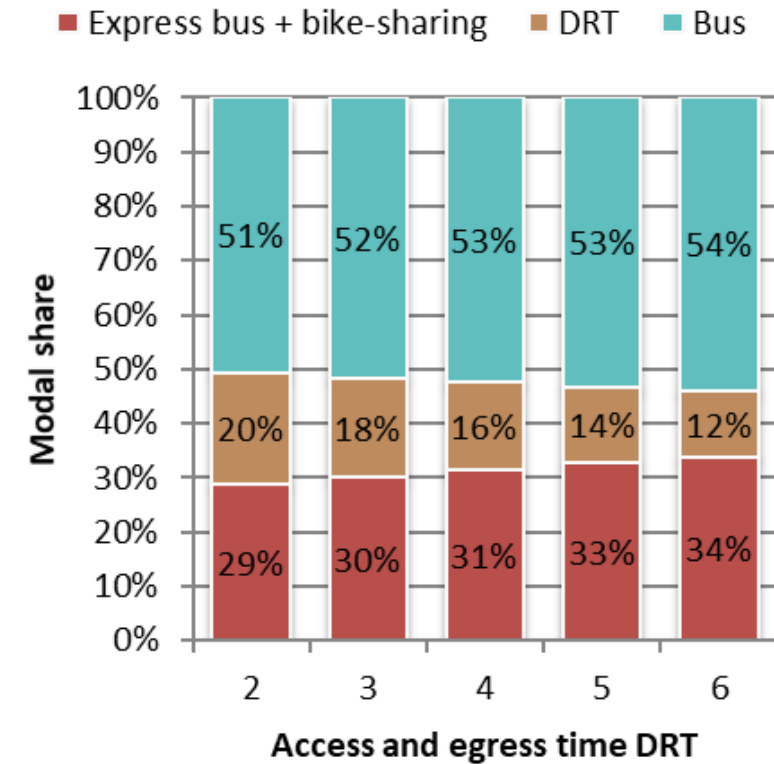
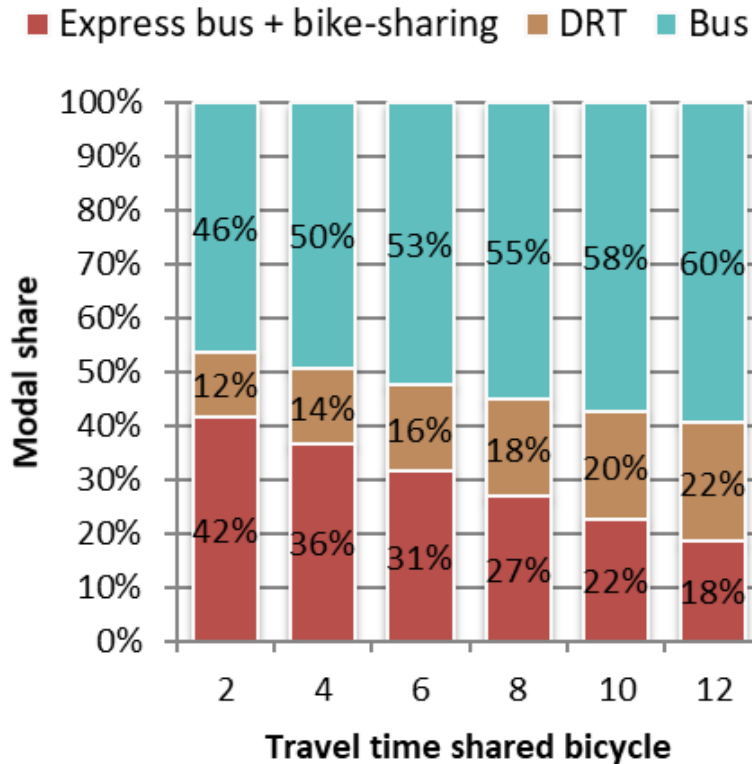


■ Express bus + bike-sharing ■ DRT ■ Bus

Reference scenario	Express-bus + bike-sharing	DRT	Bus
Access time [min]	6	4	4
In-vehicle travel time [min]	26	32	37
Egress time [min]		4	4
Shared bicycle travel time [min]	6		
Minimum booking time [min]		30	
Headway [min]	30		60
Cost [€]	3.50	3.50	3.00
Bicycle availability [# bicycles]	6		
Departure delay [min]		0-10	

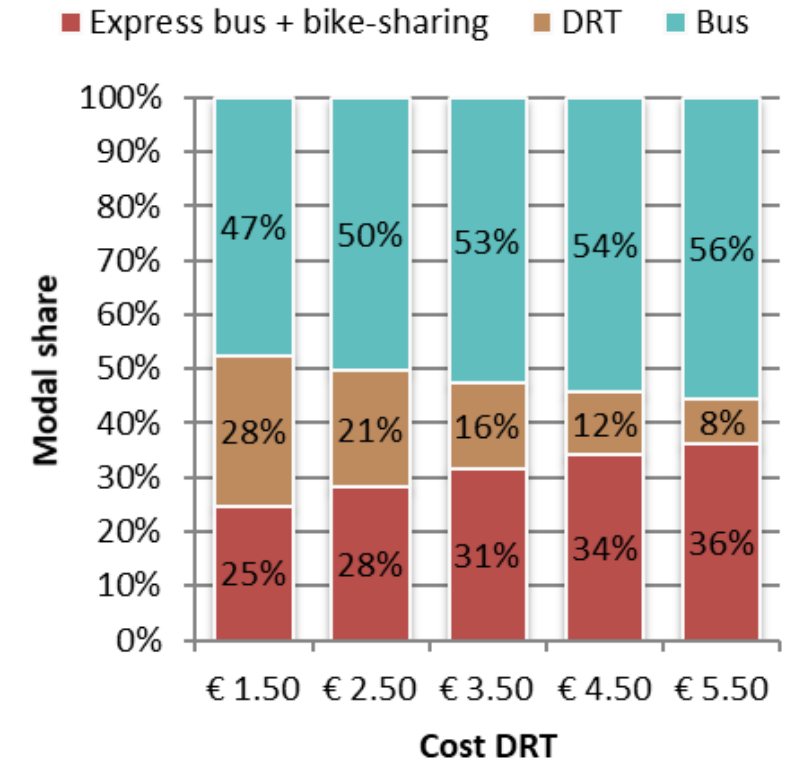
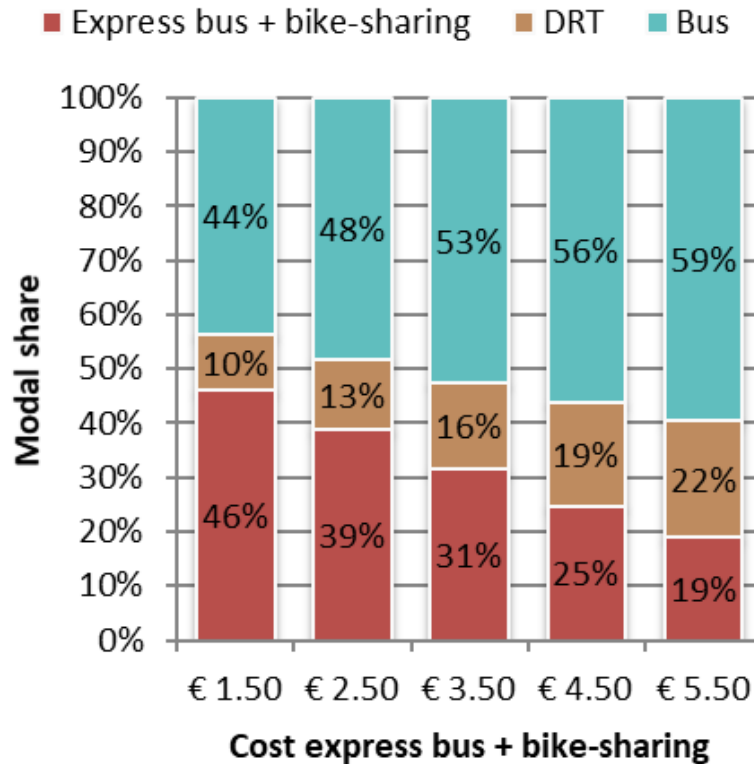
# Sensitivity access and egress times

- Egress-time bike:
  - ~10% drop per add. 4 min.
- Access & Egress time DRT:
  - ~8% drop per add. 4 min.



# Sensitivity cost

- Cost express-bus + bike-sharing:
  - ~7% drop per add. 1€
- Cost DRT:
  - ~5% drop per add. 1€



# Conclusions

- Cost and time > reliability and flexibility
- Express-bus + bike-sharing > DRT
- Traditional bus most popular

# Recommendations

## Express-bus + bike-sharing:

- Trade-off access/egress time and in-vehicle time
  - Stop density
- Fares
- Focus on 15-29 year olds

## DRT:

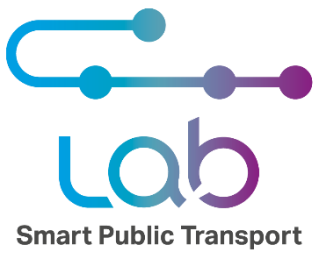
- Trade-off access/egress time and in-vehicle time
  - Detours
  - Stop density
- Fares

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Thank you!