Weather Impact on Micro Mobility and Public Transport: *when, who and what?*

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Introduction

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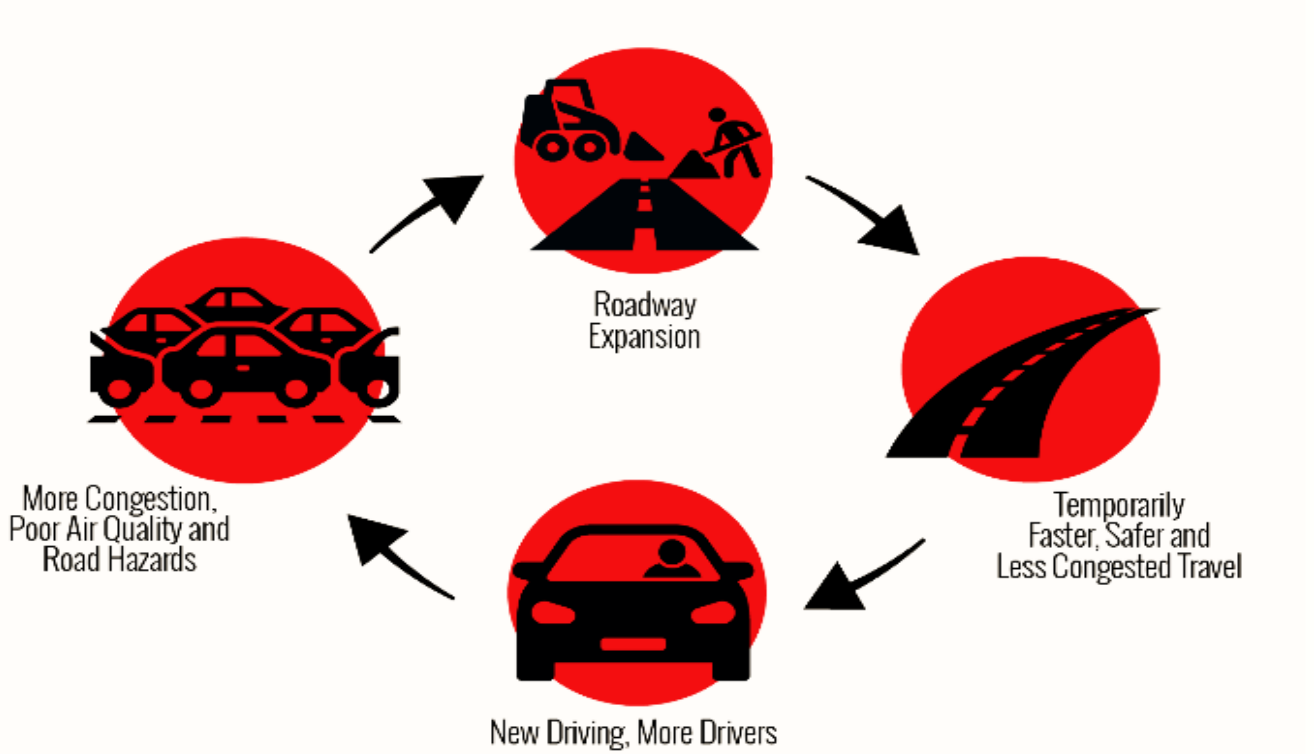

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By Shannon Thaler

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- If you build more roads, more traffic will come(Induced demand)
- Jevons' Paradox: EVs are cheaper to run, but has potential to increase car use.
- Sustainable Alternatives: This realization pushes cities to optimize existing infrastructure and transform urban areas into more livable cities
- Zero Growth Goal: focusing on reducing the need for private vehicles by promoting walking, public transport, and cycling to meet growing urban mobility demands

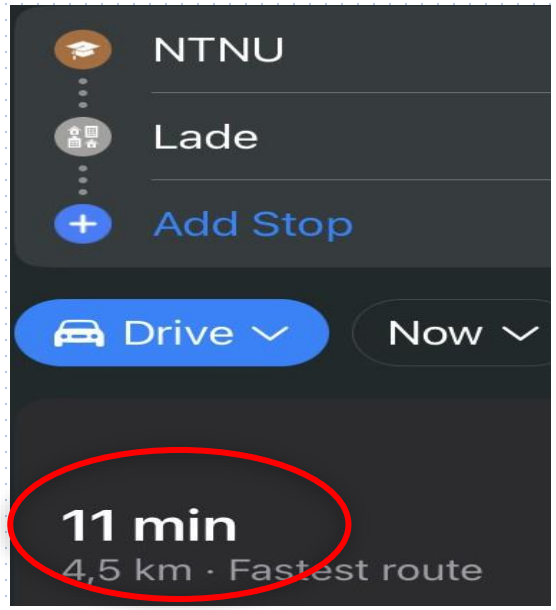
Introduction

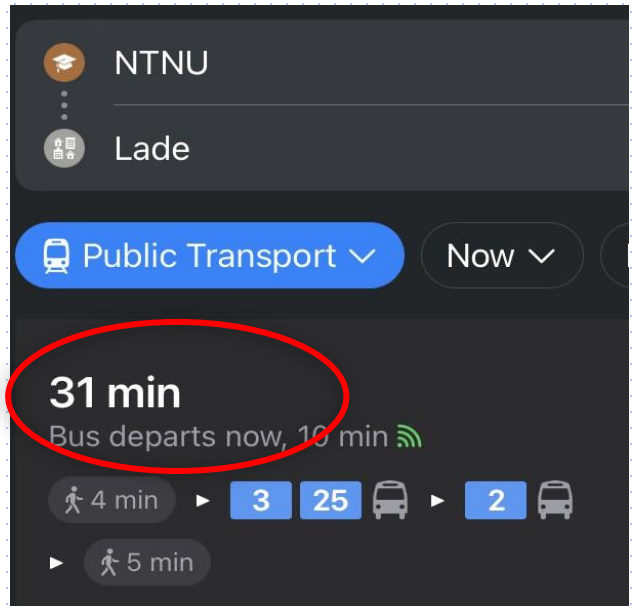
Does Weather Impede the Objective of Zero Growth Targets?

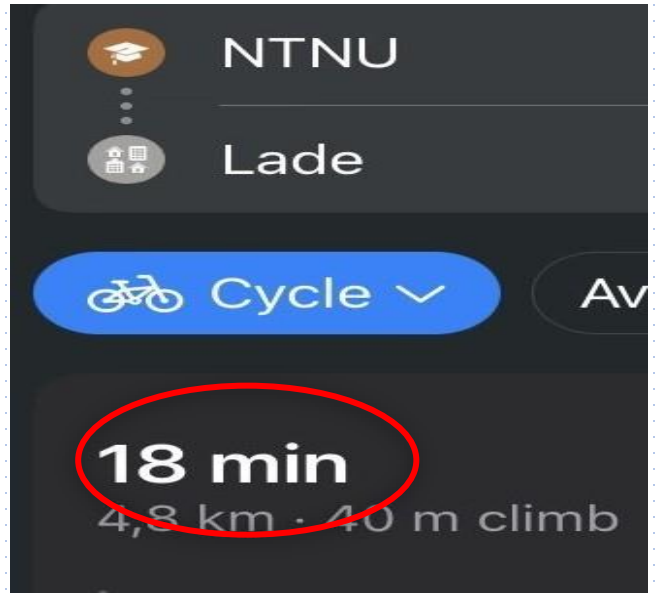
Weather Conditions:

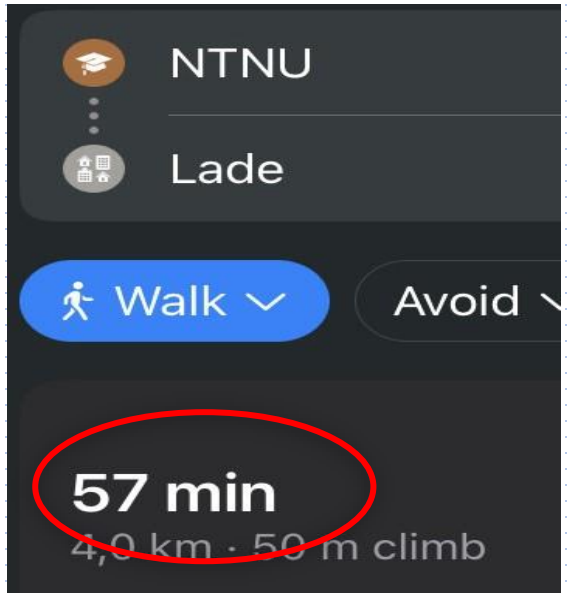
- Often overlooked by transport modelers but crucial for sustainable mobility.

Current Model









Introduction

Objective:

- To examine how weather impacts micromobility and public transport.

Research Questions:

- **What and When:** What modes are most affected by different weather conditions?
- **Who:** Who shifts their mode of transport?

Materials and Method

Materials and Data

•**2022 National Household Travel Survey** for Trondheim was used.

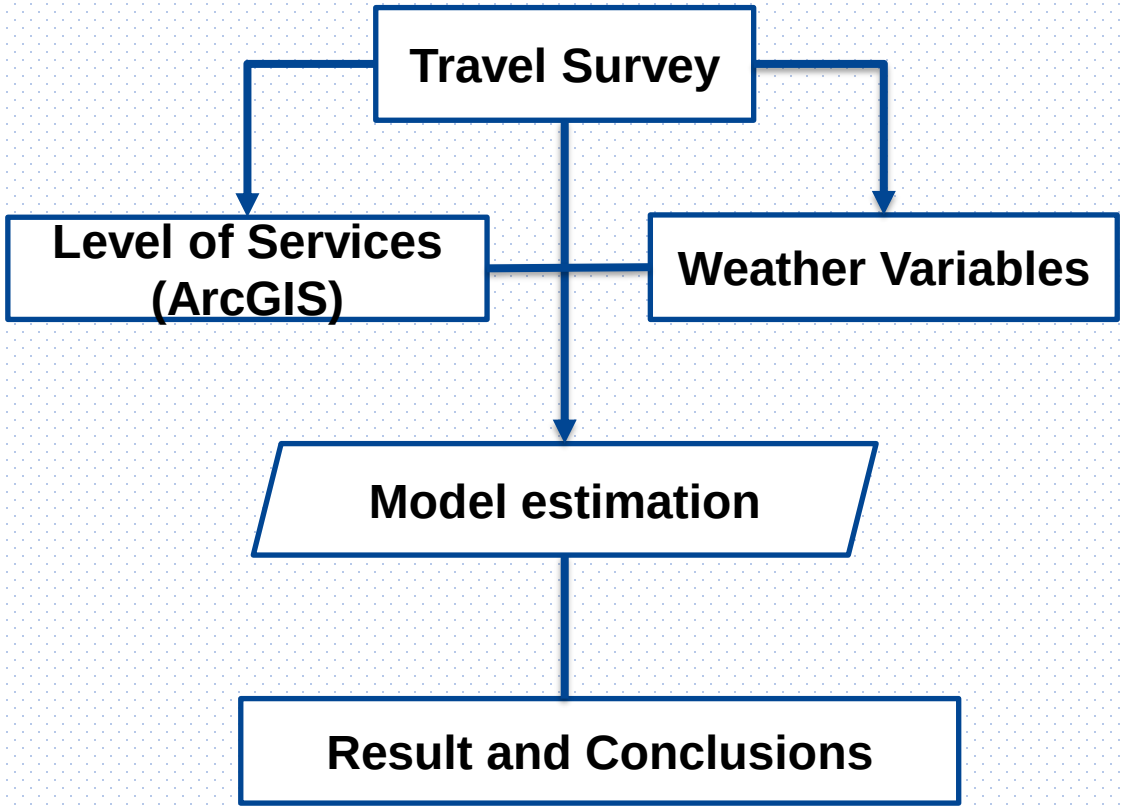
• Trips that start and end at Trondheim were utilized

•**Weather Data**: Six variables extracted from Copernicus data store for 2022, in hourly resolution.

•**Level of Service Data**: Generated using **ArcGIS** and networks:

- **Car Network** (for car driving and passengers)
- **Bicycle Network** (for bicycle)
- **Public Transport Network** (GTFS data)
- **Pedestrian Network**

Apollo Package was used for model estimation.



Result

Estimated Coefficients in percentage for Weather Impacts on Mode Choice

Weather Variables	***Car Passenger***	***Public Transport***	***Biking***	***Walking***
Wind Speed(Km/h)		-1.2%	-2.0%	-1.0%
Dark	21.7%	-51.7%	-87.8%	-13.3%
Rainfall(mm)	-31.2%	-24.2%	-50.1%	-22.8%
Snow Depth(mm)	-19.6%	-38.0%	-27.3%	-7.3%
Snowfall(mm)	15.9%	37.5%	-9.2%	5.6%
Temperature(5-10^{o}c)	34.1%	47.8%	38.0%	20.7%
Temperature(10-15^{o}c)	4.0%	-18.9%	33.0%	
Temperature(>15^{o}c)		-29.7%	2.5%	

Weather conditions significantly affect non-car modes

Relative to Car Driving

> 10% increment

< -50% decrement

-20 to -50%

Conclusions

- Extreme weather negatively impacts the sustainable mobility (PT, biking, walking).
- **Biking**: Most sensitive mode – ***41.8%*** drop in darkness, ***22%*** drop in heavy precipitation.
- **Public Transport**: Second most affected - but preferred during snowfall over private cars.
- **Walking:** less sensitive to weather conditions(accelerating the adoption of 15 minutes cities concept)
- **Car Driving**: Weather-resistant and attracts over **60%** of cyclists in adverse conditions.

Future works

- This model will be refined and finalized as **comprehensive demand model** for urban mobility modeling→(**assignment agonistic model**)

THANK YOU!