EMMA

Empowering multi- and intermodal accessibility analysis

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Project Overview

„Development, application, and assessment of a model to optimize the accessiblility of work places in terms of multi- and intermodal mobility"

Goals:

(1) Identification and quantification of impact factors on workers' mobility behaviour

(2) Development of an accessibility model, which enables the sustainable development of work place locations, avoiding and mitigating highly car-dependent workplace developments

(3) Application of the model on the regional as well as on a local scale (cases studies) to develop and assess scenarios for future development

(4) Contribution to a better understanding of accessibility analysis for planning and mobility

– DFG-funded, proposal written by Julia Kinigadner, Benjamin Büttner & Gebhard Wulfhorst
– Duration: 01/2019 – 07/2021 (2.5 years)

Phase 1: Impact Factors

Goal
Identifying the isolated effects of the workplace location (and its structural properties) on commuting behaviour of its workers in the Munich Metropolitan Region (MMR).

Hypothesis
The workplace location and its accessibility has an impact on the mobility behaviour of its workers.

Methodology
(1) Region-wide survey (2014/15)
– Executed within the project "Wohnen-Arbeiten-Mobilität" in the Munich Metropolitan Region. See Thierstein et al. (2016) for all details.
– Respondents: 7,302 persons, filtered to 996 who have changed the workplace location, but not the residence.
– Thierstein et al. have clustered the MMR into 5 spatial clusters, which are used in this analysis

(2) Statistical Analysis
– Data was processed in Rstudio
– Main methods: Chi-squared test and flow diagrams

Results
Chi-squared tests: significant (p<0.001) impact of the current workplace's spatial cluster on the commuting mode:
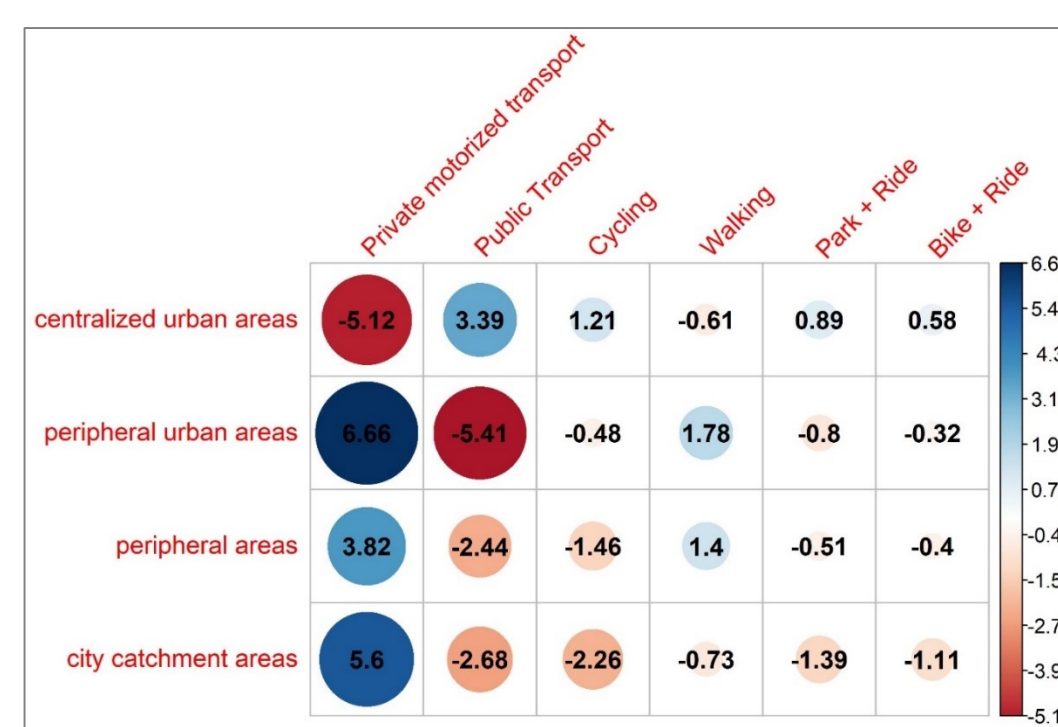

Fig. 2: Residuals of the Chi-Squared-Analysis

We isolate the impact of the workplace location by focusing on those who have changed their mode with the workplace location change (33% of the sample, n=330).

On a general level, almost no modal change is observed. However, for flows from "centralized urban areas" to "other areas", we find a strong increase in car trips, while the public transport share decreases. When the workplace changes in the opposite direction, we observe the opposite effect.
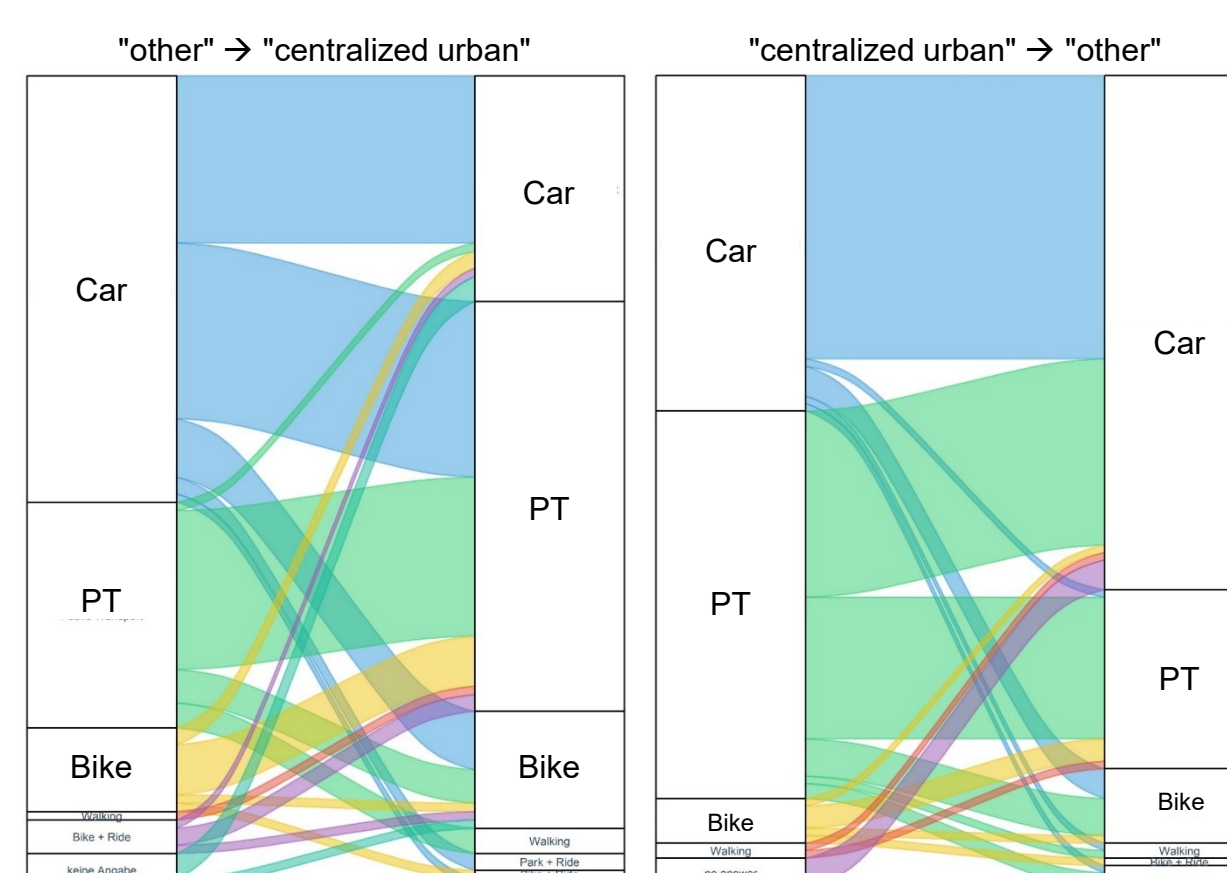

Fig. 3: Flow Diagrams

Conclusions for policy and practice:
- strong inter-dependence between workplace location and the mode to work
- relatively strong elasticity in the mobility behaviour of workers
  → potential for behavioural change
- "workplace location changers" should be addressed in targeted mobility management programs
- the high impact of the workplace location calls for strategic regional workplace development in the MMR.

Phase 2: Accessibility Model

Goal
Development of a GIS-based accessibility model from the workplace locations' point of view, calculating the accessible workers in a multimodal and intermodal network as the main indicator.

Hypothesis
The accessibility model will identify workplace locations with a accessibility surplus or deficit and will thereby help to optimize the planning for better workplace locations in the MMR.

Methodology
(1) Data
– Census 2011 population, Dun&Bradstreet workplaces, Landesverkehrsmodell Bayern for public transport GTFS, Open Street Map, results from Phase 1

(2) Tools & Model Setup
– PostGIS Database for data management and queries
– Open Trip Planner for multi- & intermodal routing, isochrones calculation based on OSM and GTFS
– RStudio, QGIS, PostGIS for calculations

This approach allows to calculate the accessibility directly through isochrones and not via static OD matrices.

First results
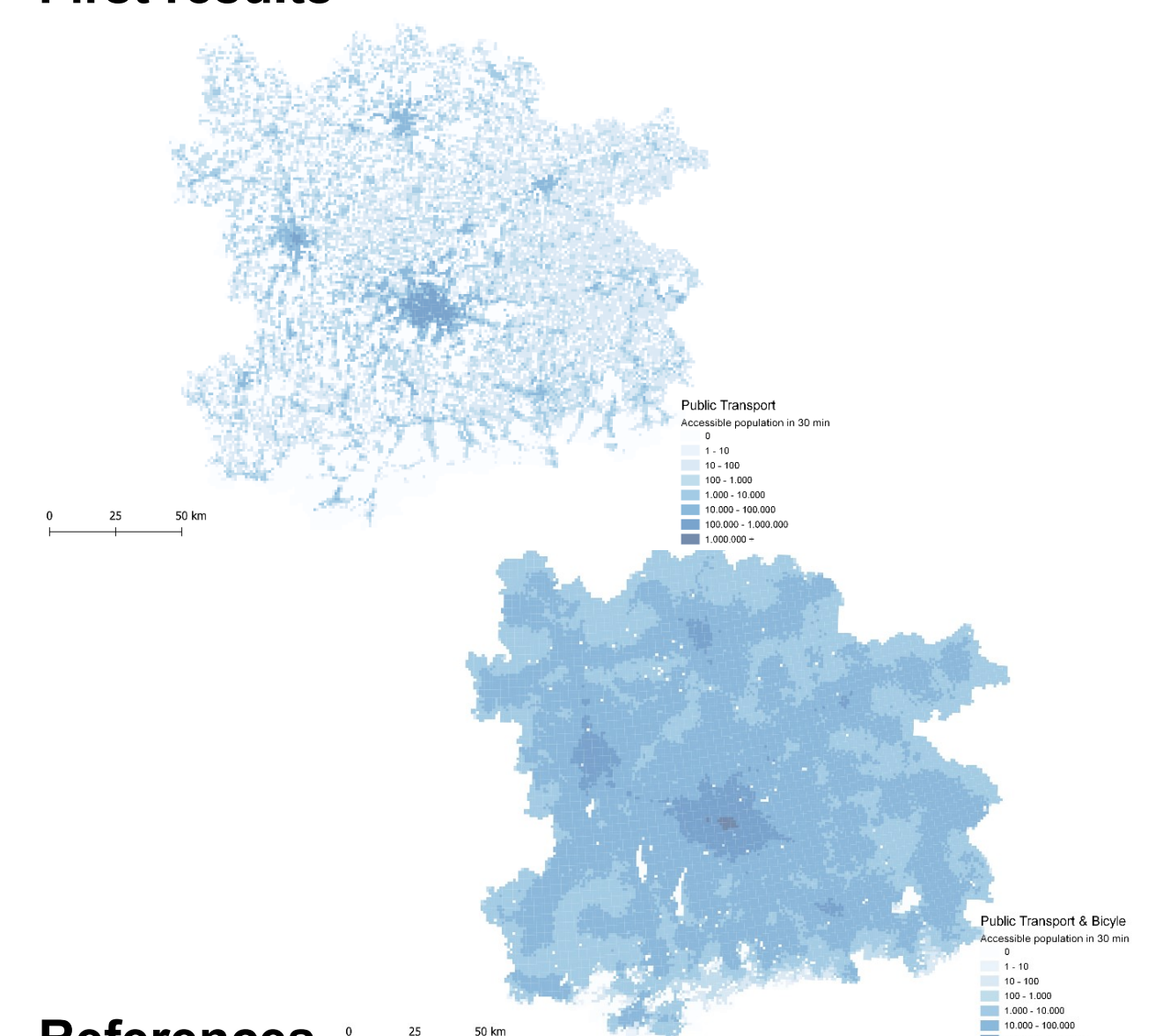
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