TECHNICAL NOTE Nº. 1

CONCEPTUAL FRAMEWORK AND RESEARCH METHODS

CREATE PROJECT

Congestion Reduction in Europe, Advancing Transport Efficiency

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FRAMEWORK FOR EXPLAINING TRENDS IN CAR USE

Various factors need to be considered for understanding car use. The quantitative analysis in WP3 therefore builds on a comprehensive conceptual framework including static framework conditions, macro trends, interventions and policies, policy outcomes as well as travel behaviour components.

STRATEGIES FOR SHAPING FUTURE TRANSPORT SYSTEMS AND TRAVEL BEHAVIOUR

(BUILT) ENVIRONMENT
Coordinated land use and transport planning, density, diversity

ENGINEERING
Future-oriented transport infrastructures and services

ENFORCEMENT
Speed limits, enforcing parking management, right-of-way laws

ECONOMY
Prices, monetary incentives, taxes

EDUCATION
Campaigns, personalised travel planning, information

EVALUATION
Continuous monitoring of transport demand/supply, macro factors

Macro Trends

Macro trends include changes in cities' characteristics from outside the sphere of transport policy that impact on transport systems and travel behaviour. Examples are changes in population size and composition as well as in other characteristics of the built environment such as densities and land use patterns. Economic developments (e.g. in income or prices) are further strong macro factors.

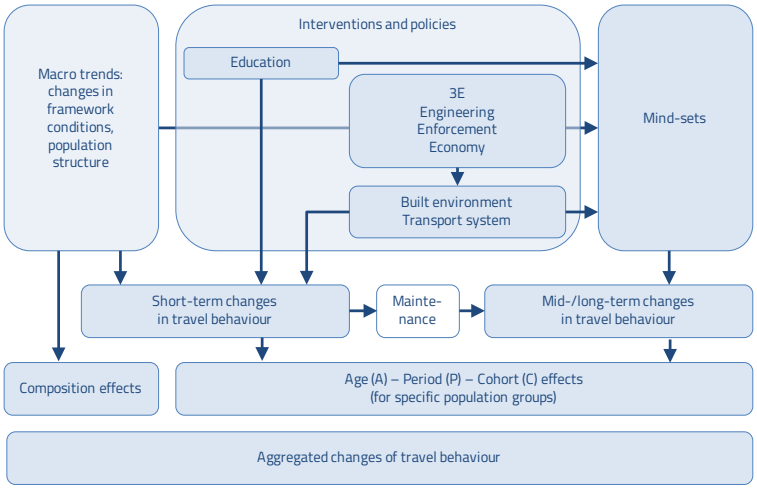
The E-Policies

The 'well-known framework of 4 Es' (Engineering, Enforcement, Economy, and Education) is used classifying measures for dis-incentivising car ownership or car use or for promoting the use of alternative modes.

Two further Es (Environment, Evaluation) are introduced for acknowledging the importance of coordinated land-use and transport planning and of continuous monitoring practices.

Mind-Sets and Behaviour

Macro trends and policies impact directly on travel behaviour or indirectly via changed mind-sets. Short-term changes in travel behaviour need to become routines for turning into stable new behaviour. Aggregated changes in populations' behaviour result from composition effects and from behavioural changes of specific person groups. The latter is composed of age, period and cohort effects.

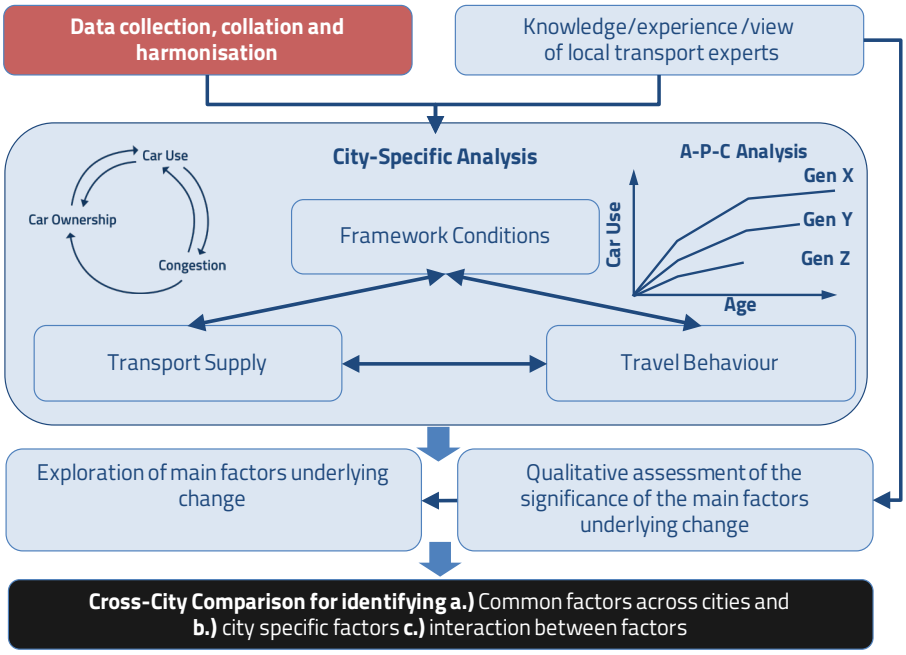


RESEARCH METHODS AND DEFINITIONS

Holistic approach for understanding car use

Research Methods

Interactions between transport supply, macro factors, framework conditions, policies and travel behaviour are complex and cannot be fully described quantitatively. Therefore, qualitative and quantitative analyses have been combined into a holistic approach for understanding car use and travel behaviour. A qualitative assessment of main factors underlying change was developed using expert knowledge. Quantitative data analysis was performed based on macro data (e.g. city-specific framework conditions, economic developments, transport supply and policy outcomes) and household travel survey micro data. This multi-method and multi-data approach allows for identifying common factors across cities and also city-specific factors and developments.



Key variables considered

Drivers Licences
Having a drivers licence is a prerequisite in order to actively choose to travel as a car driver. Therefore, driving licence acquisition within a population is an important influential factor for car use.

Car Use
Car use is understood as residents' daily car driver/passenger trips. This study focuses on trip rates (number of trips per tripmaker per day) as these are the main indicator for mobility participation and mode choice. Mileage is reported with secondary priority as the main indicator for network load and environmental impacts of travel.

Car Ownership
Car ownership can be assessed by different reference levels (per capita as personal ownership or how many cars belong to a specific household). This study defines car ownership on household level.

Population Composition
Changes in population composition are a main driver for aggregated changes in travel behaviour, these are mainly described by age and gender distributions.

Car Access
Direct car access is one main factor of mode choice and travel behaviour. Direct car access is defined by having a drivers licence and a car ready to use in the own household.

Cohort Behaviour
Travel socialisation is shaped in childhood and youth and impacts travel behaviour throughout the whole lifetime. Younger generations today behave different from earlier ones. Cohort analysis is used to reveal these mechanisms.

PREPARATION OF A COMPREHENSIVE DATA BASE

Household Travel Survey (HTS) Micro Data

How do we get a data pool for cross-city comparisons?

Step 1
Data Collation
Understanding survey methodology and comparability issues

Step 2
Harmonisation Within Cities
Data processing and merging across survey years

Step 3
Harmonisation Across Cities
Lowest common denominator of survey contents

Step 4
Spatial and Temporal Harmonisation
Functional area types and comparable survey periods

Lesson learnt

Data Processing is time-consuming and tricky. Success is not guaranteed. The balance between input (work load) and output (data precision) needs to be found anew for each application depending on the specific research questions.

Trends in mobility behaviours are commonly monitored by household travel surveys. These surveys are conducted periodically at national and local levels. Survey traditions already go back to the 1960s although spatial and temporal coverage, items, definitions, and methods vary sometimes significantly across survey periods.

Household travel survey data was collated as the basis for city-specific analysis and cross-city comparisons for all five Stage 3 cities within CREATE (Berlin, Copenhagen, London, Paris, Vienna) spanning a history of at least 20 years.

Household Travel Surveys as a Basis for Cross-City Comparisons

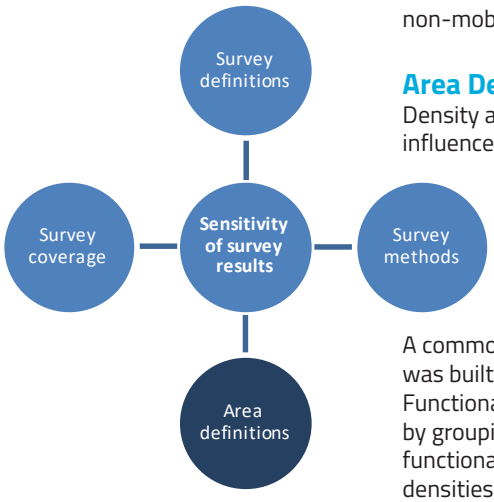
Data collation
Provision of HTS meta-data information for all cities and survey years as the basis for data collation and analysis. Different micro data formats needed to be handled.

Harmonisation
Two different harmonisation stages were completed for preparing HTS data sets. Cities partners individually performed data harmonisation for all survey years. Afterwards, city-specific micro-data were harmonised across cities and pooled into one comprehensive database by TU Dresden.

Survey Coverage
Comparable population, type of trips, seasonal coverage, reporting period (days) and survey periods were identified.

Survey definition
Trip purpose definitions and the hierarchy of transport modes were standardised. Lowest common denominators of variable categories were identified and coded.

Survey Methods
An ex-post harmonisation of survey methods is not possible but method-related influences on survey results were minimised by eliminating inconsistencies (e.g. by excluding non-mobile persons).



Area Definition
Density and mix of land use strongly influence travel behaviour.

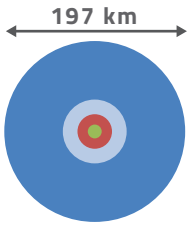
A common area type definition was built for comparison purposes. Functional area types were defined by grouping administrative and functional information on population densities in the study areas.

MANAGING DIVERSITY OF CASE STUDY CITIES

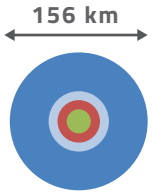
Administrative and Functional Area Types

Area Type Definition

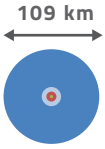
BERLIN
Solitaire city but largest overall commuters catchment area



LONDON
Metro-politan area (Mega-City)



COPENHAGEN
Small city, monocentric structure, large commuter catchment area



PARIS
Highest densities in population, workplaces

VIENNA
Monocentric city structure, sparsely populated hinterland

The definition of the spatial level of analysis was guided by two hypotheses:

1. Travel behaviour in the cities can only be understood in the regional context. It is not sufficient to only investigate the city.
2. Travel behaviour differs also within each city as a result of differences in spatial structures, transport supply and transport users' characteristics.

RESEARCH PRINCIPLES: DEFINITION OF AREA TYPES FOR CITY SPECIFIC ANALYSES AND CROSS-CITY COMPARISIONS

Case Study City Conditions

Travel behaviour differs within and across the cities as a result of differences in spatial structures, and transport supply, as well as transport users' characteristics.
City-specific data from official statistics were only available for administrative area types.

Administrative Area Types

Four administrative area types were distinguished for the analyses:

- Inner-City: City centre, Central Business District (CBD)
- Outer-City: City area beyond Inner-City, within the municipal borders
- Peri-Urban I: Area bordering the city (e.g. closest ring of municipalities) with high population density, high density of workplaces, high number of commuters to and from the Inner-City and the Outer-City
- (Optional) Peri-Urban II (and further): Wider commuting catchment area

Functional Area Types

Functional area types were defined in addition for two reasons: administrative area types' characteristics differ substantially between the case study cities; HTS data was available not only for administrative areas. The following three functional area types were defined based on the administrative classification:

- Inner-Urban: area with highest densities of residents (Inner-City for Berlin, London, Vienna, and Inner plus Outer-City for Copenhagen and Paris)
- Urban: area with second highest density of residents (Outer-City for Berlin, London, Vienna, and Peri-Urban I for Copenhagen and Paris)
- Agglomeration: low-density area surrounding the Urban area (Peri-Urban for Berlin, London, Vienna, and Peri-Urban II for Copenhagen and Paris)

These functional area types were mainly used for HTS analysis.

Berlin	Copenhagen	London	Paris	Vienna
1.05 Million	0.052 Million	3.40 Million	0.45 Million	0.50 Million
2.42 Million	0.63 Million	5.14 Million	1.78 Million	1.27 Million
0.93 Million	0.59 Million	5.47 Million	4.43 Million	N/A
1.53 Million	1.27 Million	5.79 Million	3.93 Million	0.27 Million

THIS SUMMARY IS BASED ON:

WITTWER & GERIKE (2018). REPORT OF CROSS-CITY COMPARISON (D3.3).

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