

## Abstract

### The Relevance of Geographical Indicators in modeling of Public Transport Quality

There are many factors influencing to the quality of public transport starting from the performance of the whole transport system ending with the individual characteristics of each public transport vehicle. Additional consideration of geographical patterns provides an extra explanation of the public transport market share.

This master thesis is focused on the explanation of the Public Transport quality model using geographical indicators. The goal of the thesis is to explore how geographical indicators affect the modeled quality of public transport.

The total quality of public transport is the result of the combined effect of objective (actual travel time, actual travel costs, performance, safety, etc.) and subjective factors in individual travel experiences accumulated over a longer period of time. However, there is no empiric database of such parameters. Therefore parameters of Mobility in Cities Database (MCD) are taken to describe the quality of public transport. The MCD developed by International Association of Public Transport (UITP) responds to the need of planning, decision-making and research in the field of urban transport.

The MCD consists of 120 variables grouped in 15 themes. Eight themes of MCD describing objective factors of public transport was selected. The quality of public transport in this thesis is understood as a combination of these selected eight MCD themes that are Public transport supply, Background information on city, Road Traffic, Cost of passenger transport for community, Private motorized transport & public transport (comparisons), Cost of Transport for the Traveler and Private Transport Infrastructure responding for independent variables and a Mobility theme responding for a dependent variable.

First, 1-2 variables are selected out of each eight MCD themes to comprehensively describe the quality of public transport.

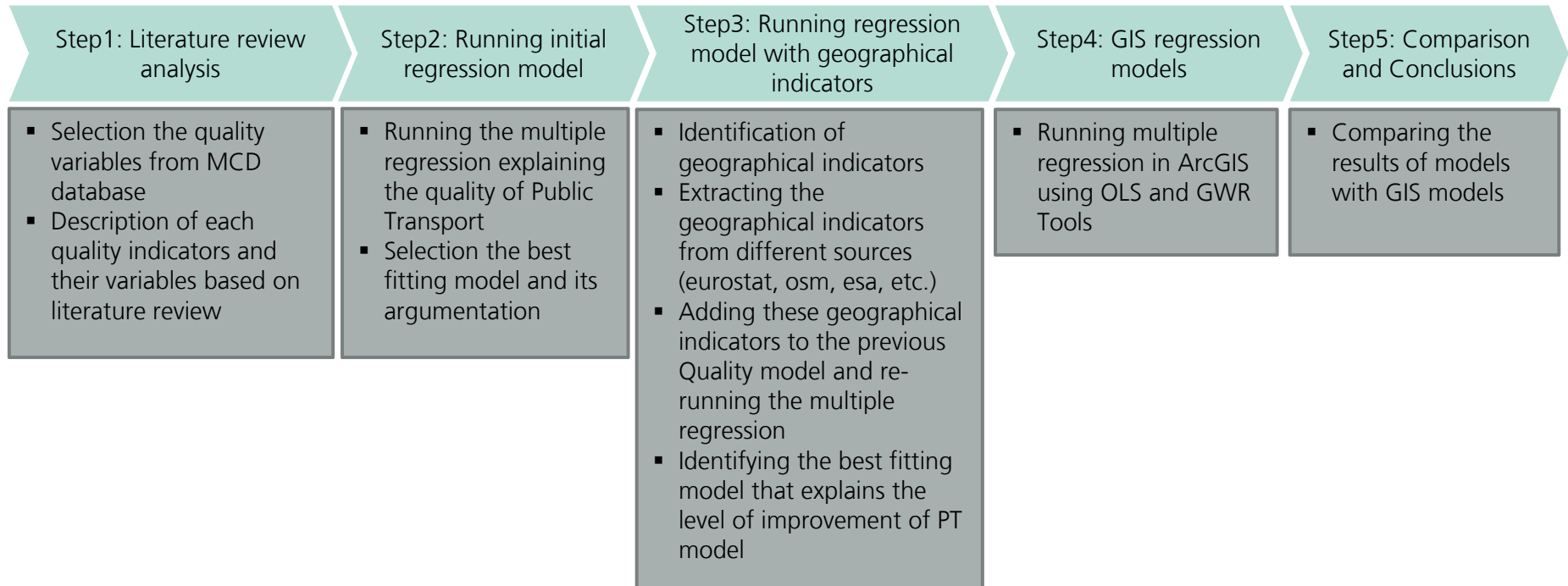
Second, a statistical analysis is performed based on these indicators. Multiple regression models are tested and the best model explaining the public transport quality is selected.

In the next step, simple geographical indicators are determined based on literature review. Data is extracted from different sources of databases such as Eurostat, OpenStreetMap, etc. Then a new regression model is established based on additionally added geographical indicators. The new model shows the impact of public transport quality within geographical indicators.

Additionally, based on the same variables describing the quality and geographical indicators, another regression analysis is implemented in ArcGIS revealing a model that examines and explores spatial relationship of different indicators. Visual representation of these features draw an easy understandable picture of different factors impact. The influence of different geographical factors are obtained and represented in maps by using ArcGIS regression analysis tools.

Finally, the results of the extended model comprising geographical indicators are extracted and compared with the initial model. The comparison of these models clearly shows the level of influence of geographical indicators on the quality of public transport.

# Workflow of Identifying Public Transport Market Share within Geographical Indicators



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# Selected Indicators by theme

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- Background Information on the City
  - **Population**
  - **GDP per inhabitant**
- Private Transport Infrastructure
  - **Parking spaces per thousand jobs in the Central Business District**
- Road Traffic
  - **Total public transport vehicle kilometres per urban hectare**
- Public Transport Supply
  - **Average public transport speed (km/h)**
  - **Total public transport place kilometres per inhabitant**
- Public Transport Productivity and Operating Cost
  - **Average public transport place occupancy rate (passenger kilometres / place kilometres)**

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- Cost of Transport for the Traveller
    - **Maximum cost of one hour of parking (roadside) in the Central Business District**
  - Cost of passenger transport for community
    - **Cost of public transport for the community in % of GDP**
  - Motorised transport and Public Transport (Comparisons)
    - **Cost of one private motorised passenger kilometre for the traveller / Average cost of one public transport passenger kilometre for the traveller**

# Regression models

