

# Transport Accessibility of Warsaw: a Case Study

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**Key words:** Cartography; Geoinformation/GI; Land management; spatial analysis; means of transport; potential accessibility; Warsaw transportation system

## SUMMARY

In this study, we detected which means of transportation is beneficial from a travel time perspective in specific districts of Warsaw, Poland. To achieve this goal, we proposed a framework to perform a spatial analysis to describe the AS-IS situation in the city (the state that the situation is in at the present time). The framework contains the following elements: attractiveness analysis, travel time and speed analysis, and potential accessibility analysis. The relationship between the averaged nominal travel speed and the number of residents was also investigated.

We used data from a journey planner, as well as land use and population statistics and employed descriptive analytics. As a study area, Warsaw, the capital of Poland, was selected. For the territory of Warsaw, 601 measurement points were defined on a 1000 meters grid. For each measurement point, the travel times to the other 600 points were calculated along with the distances and speeds. Travel times, by foot, bike, car, and public transport were determined. The travel times for public transportation and driving by car were measured at 2 a.m., 8 a.m., 12 p.m., 5 p.m., and 9 p.m. The travel times for walking and bicycling were measured only at one moment during the day. Population data were acquired from the Main Statistical Office of Poland in a grid with 1x1 km cells (primary fields). As the source of land use, the database of topographic objects (BDOT) was used.

For each 1x1 km cell, we calculated its destination attractiveness in the form of a coefficient, which can be understood as the potential usefulness of the opportunities located in the travel destination. To designate the destination attractiveness, we used feature classes from the BDOT data set to select different kinds of places where people can travel. Using statistical data, we determined how many people can go to each of these kinds of places and how often they do so. Based on this, we determined the weights of each BDOT feature class in the range of

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The results are presented as maps of travel times, travel speed, and potential accessibility, as well as scatter plots of dependencies between travel speed and number of residents. Unfortunately, public transportation ranks behind car and bike transport in terms of travel time, speed, and potential accessibility. The largest positive influence on effectiveness of traveling by public transportation is the metro and railway system; also, bikes can perfectly complement the public transportation system. The obtained results can be used to indicate directions of changes in the transportation system of Warsaw.

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