CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Public transport connectivity index – Version 5 (TRA_PT_PCA5)

DOMAIN

Transport	Environment	Energy	Society	Economy

TOPIC	**Public transport**	
IMPACT	**Public transport connectivity** *Improving the connectivity of public transport*	**TRA_PT**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Public transport is generally more environmental-friendly than motorised private transport because it facilitates the efficient use of resources by transporting a larger number of passengers in a single vehicle, thereby reducing overall energy consumption and emissions per person compared to individual private vehicles. It is therefore desirable that public transport is widely used. A requirement for the use of public transport is its connectivity: if a limited number of destinations can be reached, especially within a reasonable time, public transport cannot be an attractive or even feasible option for personal urban trips.

This indicator provides a measure of the connectivity of public transport. **It is a relevant indicator when the policy action is aimed at improving the number of destinations reachable by public transport within a certain time considering the whole city area. A successful action is reflected in a HIGHER value of the indicator.**

DESCRIPTION

This indicator is an index obtained as the average number of locations that can be reached within **20 minutes** using public transport from different places in the city. The indicator is **dimensionless**.

METHOD OF CALCULATION AND INPUTS

The indicator is calculated by means of a mathematical equation, **within the supporting tool, building on a set of required inputs**.

Method

Calculation of the index based on PT timetables and assigning the same weight to each city location

Significance: **0.50**

METHOD OF CALCULATION

The indicator is computed according to the following steps:

- **Definition of 500-metre-sided cells covering the entire territory of the city**.
- **Definition, for each 500-metre-sided cell, of the centre of gravity**. The centre of gravity can be just the geometric centre of the cell or can be differently located depending on the distribution of population in the cell or on other aspects.
- **Quantification, for each cell, of the number of other cells that can be reached using public transport within 20 minutes**. This number can be obtained identifying the boundaries of the area that can be reached within 20 minutes using public transport from the centre of gravity of a given cell and counting how many other cells are included in the area.
- **Estimation of the index** by computing the average across all cells of the numbers quantified in the previous step.

INPUTS

The following information is needed to compute the indicator:

a) A map of the city area
b) The timetable of public transport services of the city

The following information should be coded in the supporting tool to compute the indicator:

a) ${}^{c}RchbCells$. **Number of 500-metre-sided cells that can be reached using public transport within 20 minutes** from any cell ***c*.**

The experiment would be reflected in the indicator by changing the number of cells reachable in 20 minutes ${}^{c}RchbCells$. This number **should change because of modifications of public transport** (e.g. addition of one route or introduction of reserved lanes to increase speed).

EQUATIONS

The equation **computed within the supporting tool** to manage the calculation of the index (last step of the method of calculation) is the following:

$$\boldsymbol{PTConnIndex} = \frac{\sum_c {}^{c}\boldsymbol{RchbCells}}{\boldsymbol{C}}$$

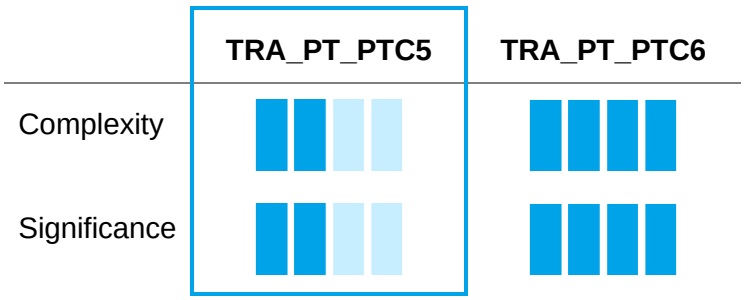
Where:

${}^{c}RchbCells$ = number of other cells that can be reached using public transport within 20 minutes from cell *c*

C = Total number of 500-metre-sided cells

ALTERNATIVE INDICATORS

An alternative indicator for measuring the same impact **for the whole city** is **TRA_PT_PTC6**. This alternative is more complex than the indicator described in this template as it uses additional information on the location of activities to weigh each destination cell. This approach not only assesses the overall supply of public transport in the city but also evaluates whether key urban functions—such as offices, educational institutions, healthcare facilities, grocery stores, and recreational spaces—are effectively connected by public transport. By accounting for the spatial distribution of services, the alternative indicator offers a more comprehensive view of accessibility. However, its calculation is more demanding, requiring detailed spatial data on service locations.



If the experiment area is just one part of the city, there are four alternative indicators to measure PT connectivity: **TRA_PT_PTC1, TRA_PT_PTC2, TRA_PT_PTC3, TRA_PT_PTC4.** These four indicators are of growing complexity and significance**.**

It should also be noted that public transport connectivity is one of the three components of **TRA_FC_AC1**. This indicator combines public transport connectivity, bike connectivity and road congestion to assess overall accessibility. The online tool automatically computes **TRA_FC_AC1** if the three sub-indicators have been calculated.