CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Public transport connectivity index – Version 4 (TRA_PT_PCA4)

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 a specific area of the city as the starting point. A successful action is reflected in a HIGHER value of the indicator.**

DESCRIPTION

This indicator is an index obtained as combination of the **number of city functions** that can be reached within **20 minutes** using public transport from one public stop or station of the experiment area. The indicator is **dimensionless**.

The city functions considered for the quantification of the indicators are:

- **Schools**
- **Administrative offices** (e.g. public administration, post, bank)
- **Hospitals**
- **Other health services** (doctors, etc.)**.**
- **Grocery shops**
- **Recreational facilities** (e.g. sport facilities, cinemas, theatres)

These functions are significant destinations of several trips for personal reasons or even for working.

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 number of functions	Significance: **1.00** 

METHOD OF CALCULATION

The indicator is computed according to the following steps:

- **Identification of the boundaries of the area that can be reached using public transport from the experiment area within 20 minutes**.
- **Quantification of the number of city functions by type located in the area that can be reached using public transport from the experiment area within 20 minutes**.
- **Definition of the relevance of each function type**
- **Estimation of the index (within the supporting tool)**.

INPUTS

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

a) $FunctNum^f$. **Number of city functions of type *f* located in the area that can be reached using public transport from the experiment area within 20 minutes.** This number should be obtained by overlapping GIS layers reporting the location of different functions on a layer reporting the boundaries of the area that can be reached within 20 minutes using public transport from the experiment area. This latter layer should be obtained using the timetable of the public transport services with a stop or station in the experiment area.

b) $FunctRel^f$. **Relevance of city functions of type *f* for the quantification of the indicator.** Initial values for this input are pre-coded in the supporting tool; the pre-coded values can be changed within the supporting tool to reflect a different view on the relevance of each function type. If the pre-coded values are changed, two conditions must be respected:

$$FunctRel^f \geq 0.05$$
$$\sum_f FunctRel^f = 1$$

The first condition implies that all functions are relevant for the calculation of the index. The second condition is just the constraint that the sum of all values is equal to 1.

The experiment would be reflected in the indicator by changing the number of city functions reachable in 20 minutes $FunctNum^f$. This number can change for one function type or for more types. **The value of $\boldsymbol{FunctNum^f}$ should change only because of modifications of public transport** (e.g. addition of one route or introduction of reserved lanes to increase speed), not because some functions have been opened or closed (unless this can be considered an impact of the experiment). **The relevance factors should remain unchanged**.

EQUATIONS

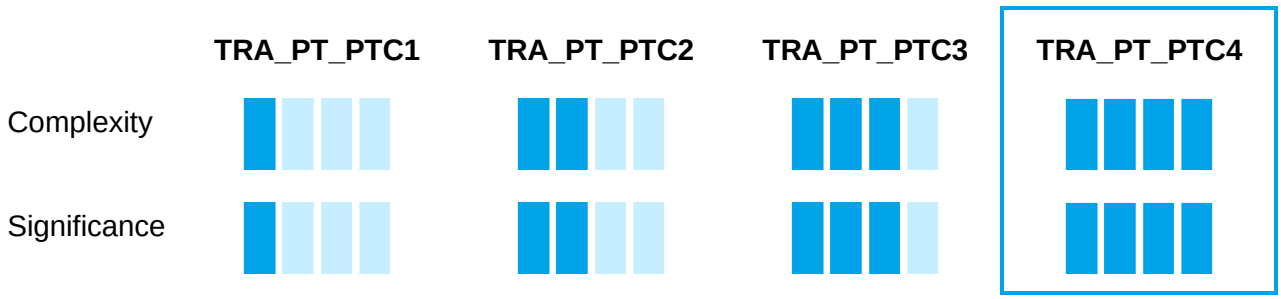
The equation **computed within the supporting tool** to manage the calculation, building on the provision of the inputs, is the following:

Estimation of the connectivity index (indicator value):

$$\boldsymbol{PTConnIndex = \sum_f \left(FunctNum^f * FunctRel^f\right)}$$

ALTERNATIVE INDICATORS

Alternative indicators for measuring the same impact **for an experiment area** are **TRA_PT_PTC1, TRA_PT_PTC2, TRA_PT_PTC3**. These alternative indicators are simpler than the indicator described in this template as they are based entirely on inputs that can be drawn from the PT timetables or, for TRA_PT_PTC1, from just a map of PT stops/stations. These indicators assess transport supply across the experiment area without considering the locations of urban functions. As such, they are simpler alternatives, and they are less significant.



If the experiment area is the whole city, there are three alternative indicators to measure PT connectivity: **TRA_PT_PTC5, TRA_PT_PTC6.** These three 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.