CIVITAS indicators

Pedestrian network connectivity index – Version 1 (TRA_WK_CN1)

DOMAIN

Transport	Environment	Energy	Society	Economy

TOPIC	**Walking**	
IMPACT	**Connectivity of pedestrian network** *Improving the connectivity of pedestrian network*	**TRA_WK**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Walkability is an important component of sustainable urban mobility, contributing to healthier, more accessible, and more liveable cities. Developing well-connected pedestrian networks encourages more trips to be made on foot, reducing reliance on motorized transport, and lowering carbon emissions. Furthermore, increased walkability creates public health benefits, promoting physical activity and reducing risks associated with sedentary lifestyles. Well-designed pedestrian networks also ensure accessibility for all users, including individuals with reduced mobility, by incorporating features such as wide footpaths and safe crossings. By prioritizing walkability, cities can make more efficient use of limited urban space, creating vibrant, people-centred environments that foster sustainability and inclusivity.

This indicator provides a measure of the connectivity of the pedestrian network. **It is a relevant indicator when the policy action is aimed at increasing the number of origin-destination pairs within a specific area of the city for which a pedestrian route entirely on reserved paths exists. A successful action is reflected in a <u>HIGHER</u> value of the indicator.**

DESCRIPTION

This indicator is an index obtained as ratio between the **total length of roads and paths in pedestrian areas in the experiment area** and the total length of roads within the experiment area. The indicator is **dimensionless**.

METHOD OF CALCULATION AND INPUTS

The indicator should be computed exogenously, by applying the method described and then coded in the supporting tool.

Method	
Calculation of the index based on the map of pedestrian areas and the map of roads	Significance: **0.50**

INPUTS

The following information is needed to compute the indicator:

a) A map of the roads on in the experiment area
b) A map of the pedestrian areas in the experiment area

The experiment would add new sections to the pedestrian-reserved network, resulting in a modification of the map of pedestrian areas in the experiment area.

METHOD OF CALCULATION

The indicator should be computed exogenously according to the following steps:

- **Calculation of the total length of the road network within the experiment area**. This calculation can be obtained from the map of roads using a GIS application.
- **Calculation of the total length of the pedestrian-only roads and paths within the experiment area**. This calculation can be obtained from the pedestrian areas map using a GIS application.
- **Estimation of the index** by computing the ratio between the length calculated in the second step and the length calculated in the first step.

EQUATIONS

The equation computing the index (last step of the method of calculation) is the following:

$$\boldsymbol{WkConnIndex} = \frac{\boldsymbol{PedRoadLnght}}{\boldsymbol{TotRoadLnght}}$$

Where:

$PedRoadLnght$ = Length of pedestrian-only roads and paths in the experiment area

$TotRoadLnght$ = Total length of roads in the experiment area

ALTERNATIVE INDICATORS

This indicator assesses the connectivity of the pedestrian-reserved network in an experiment area by measuring the share of length of pedestrian-only roads out of total length of roads in the area.

An alternative indicator for measuring the same impact is **TRA_WK_CN2**, which represents the share of pedestrian area relative to the total non-built surface within the experiment area. This indicator is comparable in both complexity and significance to TRA_WK_CN1 and may be preferred depending on the characteristics of the experiment area. TRA_WK_CN2 provides a more representative measure of pedestrian connectivity when the experiment area includes open spaces, such as parks or plazas, where pedestrian movement occurs throughout. In contrast, TRA_WK_CN1 is more suitable when large open spaces are present where pedestrian connectivity happens over some paths only, rather than the entire surface. In such cases, TRA_WK_CN2 could overestimate connectivity. In experiment areas with no large open spaces, the two indicators are equivalent. Both indicators can be used for local and whole city experiments.

TRA_WK_CN3 and **TRA_WK_CN4** measure the connectivity of pedestrian networks accounting for the number of OD pairs that can be travelled walking entirely on pedestrian-reserved paths. They target local experiments and whole city experiments, respectively. These two indicators have higher significance since they reflect the actual usability of pedestrian infrastructure for complete trips and capture network cohesion but require more complex input data.

	TRA_WK_CN1	TRA_WK_CN2	TRA_WK_CN3 (local) and TRA_WK_CN4 (whole city)


Complexity
Significance