CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Public transport accessibility justice index – Version 2 (SOC_EQ_AJ2)

DOMAIN

Transport	Environment	Energy	**Society**	Economy

TOPIC	**Equity**	
IMPACT	**Transport accessibility justice** *Providing comparable accessibility by public transport to all urban inhabitants*	**SOC_EQ**

Category

Key indicator	Supplementary indicator	State indicator

CONTEXT AND RELEVANCE

Transport accessibility justice focuses on ensuring that all urban residents have equitable access to public transport, regardless of whether they reside in the city centre or the suburbs. This promotes social equity by providing equal opportunities to access employment, education, services, and recreation. It also supports environmental sustainability by reducing reliance on private vehicles, thus lowering emissions and traffic congestion. Ultimately, it enhances quality of life and fosters inclusive economic growth in urban areas.

This indicator provides a measure of how urban accessibility by public transport is different between the city centre and the outskirts. **It is a relevant indicator when the pilot area is a whole city and the policy action is aimed at providing equitable accessibility by public transport to all citizens, including those living outside the city centre. A successful action is reflected in a HIGHER value of the indicator.**

DESCRIPTION

This indicator is the ratio between the number of city functions that can be reached within 20 minutes using public transport from one public stop or station in the outskirts and the number of city functions that can be reached within 20 minutes using public transport from one public stop or station in the city centre. Being a ratio, 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 endogenously in the supporting tool, building on a set of required inputs**.**

Method	
Calculation of the index based on PT timetables and number of functions	Significance: **0.75** 

METHOD OF CALCULATION

The indicator is computed **within the supporting tool** according to the following steps:

- Computing a connectivity index for the city outskirts areas
- Computing a connectivity index for the city centre areas
- Computing the average connectivity index across all outskirt areas
- Computing the average connectivity index across all city centre areas
- Computing the ratio between average connectivity index of the outskirts and of the city centre

INPUTS

The following information is needed to compute the indicator:

a) ${}^{f}FunctNum_{a}^{<Centre>}$. The number of city functions of different types that can be reached within 20 minutes from public transport stops and stations located in some sample areas in the centre of the city.

b) ${}^{f}FunctNum_{a}^{<Outskirts>}$. The number of city functions of different types that can be reached within 20 minutes from public transport stops and stations located in some sample areas in the outskirts of the city

c) ${}^{f}FunctRel$. The relevance associated to each city function type.

These three elements should be quantified and coded in the supporting tool. The process for the quantification of the number of city functions can consist of the two following steps:

- Identification of the boundaries of the portion of city that can be reached within 20 minutes using public transport from each sample area.
- Quantification of the number of city functions by type located in the identified portions of cities. This number can be obtained by overlapping GIS layers reporting the location of different functions on a layer reporting the boundaries of the portion of city that can be reached within 20 minutes using public transport from the sample area. This latter layer should be obtained using the timetable of the public transport services.

Initial values of the relevance associated to each city function type are predefined 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:

$$ {}^{f}FunctRel \geq 0.05 $$
$$ \sum_{f} {}^{f}FunctRel = 1 $$

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 ${}^{f}FunctNum_{a}^{A}$. This number can change for more zones or for one zone only, for one function type or for more types. In any case, **the value of 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

Building on the number of city functions of different types that can be reached within 20 minutes from public transport stops and stations located in some sample areas in the centre of the city, a connectivity index is computed, **within the supporting tool,** for each area, by means of the equation:

$$PTConnIndex_a^A = \sum_f \left({}^f AvFunctNum_a^A * {}^f FunctRel \right)$$

Then, the average number is computed, by means of the simple equation:

$$AvPTConnIndex^A = \frac{\sum_a^z PTConnIndex_a^A}{z}$$

Where:

A = city context: either city centre or outskirts

z = Number of areas considered

Once the averages are computed for both city centre and outskirts, the indicator is computed as a ratio:

$$\boldsymbol{EqAccIndex = \frac{AvPTConnIndex^{<Outskirts>}}{AvPTConnIndex^{<Centre>}}}$$

ALTERNATIVE INDICATORS

This indicator is based on the connectivity of public transport in terms city functions (e.g. offices, shops, schools, etc.) that can be reached in a certain time. This is a significant measure, but its calculation requires some georeferenced data and some elaborations. An alternative indicator is **SOC_EQ_AJ1**, which has the same form of the indicator described in this factsheet but is based on the accessibility to stops or stations. This alternative indicator is less significant, because the opportunity of reaching stops or stations does not directly imply that relevant city functions are accessible. On the other hand, the alternative indicator has the advantage of requiring simple input that can be collected straightforwardly.

	SOC_EQ_AJ1	SOC_EQ_AJ2
Complexity		
Significance