CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Share of crowded peak time public transport services (TRA_PT_CR)

DOMAIN

Transport	Environment	Energy	Society	Economy

TOPIC	**Public transport**	
IMPACT	**Public transport crowding** *Reducing crowding on public transport services*	**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 that its services are not overcrowded: if transport means are regularly or often jam-packed, public transport cannot be an attractive or even feasible option for personal urban trips.

This indicator provides a measure of the level of crowding of public transport in the experiment area. **It is a relevant indicator when the policy action is aimed at reducing the share of overcrowded public transport services. A successful action is reflected in a LOWER value of the indicator.**

DESCRIPTION

The indicator is a measure of the **share of services departing in crowded conditions from a sample of stops/stations in the experiment area**.

The indicator is a share; therefore, it is **dimensionless**.

METHOD OF CALCULATION AND INPUTS

The indicator is calculated as the ratio between the number of services departing in crowded conditions from a sample of stops/stations and the total number of services departing from the same sample of stops/stations.

The public transport services should be monitored in the experiment area, the result of the observations should be used to quantify the indicator and the results should be coded in the supporting tool.

There are two alternative methods of calculation available for this indicator. The three methods distinguish for the number of stops/stations and the period monitored. The method based on a larger number of stops/stations and a longer period implies more complexity but provides more significant results.

METHOD 1	METHOD 2
Crowded services in a sample of stops/stations in one day	**Crowded services in a larger sample of stops/stations and in more days**
Direct observation in a limited number of circumstances	Direct observation in a larger number of circumstances
Complexity 	Complexity 
Significance 	Significance 

Method 1

Crowded services in a sample of stops/stations in one day	Significance: **0.50** 

INPUTS

The following information is needed to compute the indicator according to method 1:

a) ${}^{s}TotSrvDep$. **Total number of services departing from stop/station *s*.**
b) ${}^{s}CrwdSrvDep$. **Number of services departing in crowded conditions from stop/station *s*.**

The experiment would be reflected in the indicator by changing one of these two inputs as effect of the measures implemented. In theory, the most direct effect of the measures should be the reduction of the number of services departing in crowded conditions being equal the total number of departures. However, it could be that the experiment implies an increased supply of public transport services.

METHOD OF CALCULATION

Using Method 1, the indicator **should be computed exogenously** according to the following steps and then coded in the supporting tool:

- **Selection of the stops/stations to be monitored.** The number of stops/stations to be monitored depends on the size of the experiment area (and, therefore, of the overall

number of stops/stations in the experiment area). As for the number of stops/stations to be monitored is concerned, the following table provides recommendations:

Nr of stops/stations in the experiment area	Indicative sampling share	Minimum number of sampled stops/stations
<50	5%	3
50 – 100	10%	5
100 – 250	7%	10
> 250	3%	12

The selection of stops should be made considering the following rules:

- If more types of public transport services exist in the experiment area (e.g., bus, tram, metro), they should all be covered by the sample.
- All public transport lines in the experiment area should be covered by at least one stop/station.
- When, for a specific line, more stops/stations are monitored, they should not be contiguous to each other.
- Meaningful stops/stations should be selected considering relevant generators and attractors of trips. For instance, if a rail station attracts and generates many public transport passengers, stops should be selected to monitor both the crowding of services arriving to the station and the crowding of services leaving from the station. In a nutshell, “stressed” stops/stations should always be included.

- **Registration of the level of occupancy of all services departing from the sampled stops in two hours of the morning peak time of one sampling day.** The level of occupancy should be registered according to a simple categorisation:
  - **Non-crowded**: boarding was smooth, there can be passengers standing but density is limited.
  - **Crowded**: boarding was difficult, there are many passengers standing throughout the whole vehicle/coach.

- **Estimation of the share of crowded services** as ratio between the number of services registered as crowded and the total number of observed services in all sampled stops.

EQUATIONS

The equation that should be applied to compute the indicator is the following:

$$\boldsymbol{PTCrwd} = \frac{\sum_s {}^{s}\boldsymbol{CrwdSrvDep}}{\sum_s {}^{s}\boldsymbol{TotSrvDep}}$$

Method 2

Crowded services in a larger sample of stops/stations and in more days

Significance: **0.75**

INPUTS

See method 1

The experiment would be reflected in the indicator by changing one of these two inputs as effect of the measures implemented. In theory, the most direct effect of the measures should be the reduction of the number of services departing in crowded conditions being equal the total number of departures. However, it could be that the experiment implies an increased supply of public transport services.

METHOD OF CALCULATION

See method 1.

The differences for this method 2 refer to the **number of sampled stops** and/or to the **number of sampled days**.

- The number of sampled stops should be larger than for method 1, according to the following table.

Nr of stops/stations in the experiment area	Indicative sampling share	Minimum number of sampled stops/stations
<50	25%	8
50 – 100	20%	15
100 – 250	15%	25
> 250	10%	30

- **At least three different days** should be sampled**.**

EQUATIONS

See method 1.