CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Average share of occupied parking places (TRA_US_PK)

DOMAIN

Transport	Environment	Energy	Society	Economy

TOPIC	**Urban Space**	
IMPACT	**Parking space efficiency** *Improving the efficiency of urban space used for parking*	**TRA_US**

Category

Key indicator	**Supplementary indicator**	State indicator

CONTEXT AND RELEVANCE

Parking in urban areas is often responsible for excessive land use and traffic congestion. To address this, sustainable urban mobility policies may focus on reducing the number of car parking spots, thereby improving environmental and social sustainability. By decreasing parking availability, the time cost of driving increases due to longer search times for parking, making public transport and active mobility more attractive. Additionally, reducing car parking spots frees up valuable urban land, which can be repurposed for green spaces, parks, public transport priority lanes, bike paths, and pedestrian zones. Ultimately, these measures contribute to creating more liveable and sustainable urban environments.

This indicator provides a measure of the share of parking places occupied by vehicles in the experiment area. **It is a relevant indicator when the policy action is aimed at reducing the urban space dedicated to parking and using more efficiently those remaining. A successful action is reflected in a HIGHER value of the indicator.**

DESCRIPTION

The indicator is a measure of the average **share of occupied parking places** within the experiment area.

The indicator is expressed in % so it 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.

There are two alternative methods of calculation available for this indicator. The two methods distinguish for the complexity of the quantification and for their significance.

METHOD 1	METHOD 2
Share estimated on two sample days	**Share estimated on several sample days in different day hours**
It is assumed that two sample days and the observed hours are representative of average conditions.	It is assumed that the sample days are representative of average conditions
Complexity 	Complexity 
Significance 	Significance 

Method 1

Share estimated on two sample days without specific requirements on monitored day hours

Significance: **0.25**

INPUTS

The following information is needed to compute the indicator:

a) **The total number of public parking places in the experiment area**. The number of public parking places should include those in dedicated structures (e.g., parking areas, garages) as well as kerbside places both where they are explicitly identified (e.g., by painted lanes) and where they are used even if not explicitly identified. Even normally tolerated irregular parking places should be included. This information can be collected by visual inspection of roads and structures in the experiment area. An alternative approach that might partially replace a physical inspection is using a GIS map to observe parking areas and/or measure the length of roads to estimate the number of kerbside parking places dividing the roads length by a standard size of parking place.

b) **The number of vehicles parked** in public places of the experiment area **in two sample days**: a working day and a non-working day. This information can be collected by means of direct counts. According to this method, the counts should be carried out just in two sample days. The only recommendation is avoiding extraordinary conditions (e.g., avoiding Christmas time or summer holidays or a weekend day when a music show is organised in the experiment area). There are no requirements on the hours of the day when counts should be made.

The experiment would result in a modification of the total number of public parking places (e.g., because some areas are closed) or of the number of parked vehicles.

METHOD OF CALCULATION

Using Method 1, the indicator should be computed **exogenously** according to the following steps:

- **Quantification of total number of public parking places in the experiment area**.
- **Estimation of the average number of parked vehicles.** The average is computed considering the input data collected for the working day and for the non-working day (see equation below).
- **Estimation of the index** by computing the ratio between the average number of parked vehicles quantified in the second step and the total number public parking places.

EQUATIONS

The average number of parked vehicles should be computed as follows:

$$ParkVeh = WorkParkVeh * 0.6 + NonWorkParkVeh * 0.4$$

Where:

$WorkParkVeh$ = observed number of parked vehicles in the sample working day

$NonWorkParkVeh$ = observed number of parked vehicles in the sample non-working day

Estimation of the share of occupied parking places (indicator value):

$$\boldsymbol{OccParkPlcSh} = \frac{\boldsymbol{ParkVeh}}{\boldsymbol{ParkPlc}}$$

Where:

$ParkVeh$ = average number of parked vehicles

$ParkPlc$ = total number of public parking places in the experiment area

Method 2

Share estimated on several sample days with specific requirements on monitored day hours

Significance: **0.50**

INPUTS

The following information is needed to compute the indicator:

a) **The total number of public parking places in the experiment area**. The number of public parking places should include those in dedicated structures (e.g., parking areas, garages) as well as kerbside places both where they are explicitly identified (e.g., by painted lanes) and where they are used even if not explicitly identified. Even normally tolerated irregular parking places should be included. This information can be collected by visual inspection of roads and structures in the experiment area. An alternative approach that might partially replace a physical inspection is using a GIS map to observe parking areas and/or measure the length of roads to estimate the number of kerbside parking places dividing the roads length by a standard size of parking place.

b) **The number of vehicles parked** in public places of the experiment area **in some sample days**. This information can be collected by means of direct counts. According to this method, the counts should be carried out in **at least five days**: **at least three working days, at least one Saturday and at least one Sunday**. It is recommended avoiding extraordinary conditions (e.g., avoiding Christmas time or summer holidays or a weekend day when a music show is organised in the experiment area). Working days should be no less than 60% and no more than 80% of the total number of sampled days. In each of the sample days, the collection of the number of parked vehicles should be repeated in **three time periods: 9:00 – 11:00 in the morning; 14:00 – 16:00; 20:00 – 22:00**.

The experiment would result in a modification of the total number of public parking places (e.g., because some areas are closed) or of the number of parked vehicles.

METHOD OF CALCULATION

Using Method 2, the indicator should be computed **exogenously** according to the following steps:

- **Quantification of total number of public parking places in the experiment area**.
- **Estimation of the average number of parked vehicles.** The average is computed considering the input data collected for the five sample days and three time periods in each day (see equation below).
- **Estimation of the index** by computing the ratio between the average number of parked vehicles quantified in the second step and the total number public parking places.

EQUATIONS

The average number of parked vehicles should be computed as follows:

$$ParkVeh = \frac{\sum_d \sum_t ParkVeh_t^d}{D * 3}$$

Where:

$ParkVeh_t^d$ = observed number of parked vehicles in the time period *t* of the sample day *d*

D = number of sampled days

Estimation of the share of occupied parking places (indicator value):

$$\boldsymbol{OccParkPlcSh} = \frac{\boldsymbol{ParkVeh}}{\boldsymbol{ParkPlc}}$$

Where:

$ParkVeh$ = average number of parked vehicles

$ParkPlc$ = total number of public parking places in the experiment area