CIVITAS
Sustainable and smart mobility for all
2030

CIVITAS indicators

Autonomous bots for B2C deliveries (TRA_FR_ADC3)

DOMAIN

Transport	Environment	Energy	Society	Economy

TOPIC	**Freight**	
IMPACT	**Alternative urban freight transport** *Increasing the use of autonomous bots for B2C deliveries*	**TRA_FR**

Category

Key indicator	**Supplementary indicator**	**State indicator**

CONTEXT AND RELEVANCE

Motorised freight transport refers to the movement of goods using motor vehicles such as trucks and vans. This mode of transport is widely used to deliver goods to customers in urban areas, but it contributes significantly to energy consumption, emissions, noise, and space occupancy. These factors negatively impact environmental sustainability and quality of life in cities.

Alternative solutions for urban deliveries, such as cargo bikes, parcel lockers, autonomous bots, drones, and shared logistics, can help reduce the reliance on conventional motorized freight transport. These alternatives contribute to lower emissions, reduced noise pollution, and improved space efficiency in urban areas.

This indicator provides a measure of the number of autonomous bots used for B2C deliveries in the experiment area. Autonomous bots for urban deliveries are self-navigating robotic systems designed to transport goods without direct human control. These bots typically use a combination of sensors, cameras, and GPS to navigate sidewalks, bike lanes, or roads while avoiding obstacles and ensuring safe interactions with pedestrians and vehicles.

This indicator is relevant when the policy action aims to increase alternatives to motorized road freight vehicles for transporting urban goods. A successful action is reflected in a HIGHER value of the indicator.

DESCRIPTION

The indicator is the ratio between the **number of autonomous bots used for B2C deliveries in the experiment area** and the number of inhabitants.

The unit of measurement of the indicator is **autonomous bots per inhabitant**.

METHOD OF CALCULATION AND INPUTS

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

Method 1

Estimation based on direct observation	Significance: **0.15** 

INPUTS

The following information is needed to compute the indicator:

a) The number of autonomous bots used by logistics providers for B2C deliveries in the experiment area
b) The number of inhabitants in the experiment area.

The experiment would result in a modification of the number of autonomous bots used for B2C deliveries.

METHOD OF CALCULATION

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

- **Retrieval of the number of autonomous bots used for B2C deliveries in the experiment area**. If in the 'before' scenario no autonomous bots are used for B2C deliveries in the experiment area, this value equals zero.
- **Retrieval of the number of inhabitants within the experiment area.** This value can be obtained from census data.
- **Estimation of the index** by computing the ratio between the number of autonomous bots retrieved in the first step and the number of inhabitants obtained in the second step.

EQUATIONS

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

$$\boldsymbol{AltB2CFreightIndex} = \frac{\boldsymbol{AutBots}}{\boldsymbol{Pop}}$$

Where:

$AutBots$ = Number of autonomous bots used for B2C deliveries in the experiment area

Pop = Population in the experiment area

ALTERNATIVE INDICATORS

This indicator is a measure of the use of autonomous bots for B2C deliveries in the experiment area. Other indicators to assess the availability of alternative B2C urban freight distribution modes are **TRA_FR_ADC1**, **TRA_FR_ADC2** and **TRA_FR_ADC4**. These indicators respectively measure the number of cargo-bikes, parcel lockers, and drones used for B2C deliveries. **TRA_FR_ADC5** tracks the number of users of shared logistics platforms. The choice of indicator depends on the scope of the experiment to evaluate.

If the experiment targets B2B deliveries, the relevant indicators are **TRA_FR_ADB1**, **TRA_FR_ADB2** and **TRA_FR_ADB3**.