

# Bike Sharing System

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## Mobility

A bike sharing system intends to provide a community with a shared fleet of bikes. Therefore, individual users do not have to own a bike, but rather everyone can use the fleet flexibly.

Good Health And  
Well-Being

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## Description

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A bike sharing system intends to provide a community with a shared fleet of bikes. Therefore, individual users do not have to own a bike, but rather everyone can use the fleet flexibly. Flexible options to use bikes at different locations can increase the attractiveness of biking – and thus the modal share of biking in a city – by providing more convenient options for commuters and recreational users.

For each bike sharing system, it is necessary to ensure the accessibility of the bikes and to manage the location and operation of the bikes. European bike sharing systems mostly use a dock-based concept, where bikes can be picked-up and dropped-off at specific locations. New market entrants are also disrupting the European market with free-floating and hybrid systems.

Bike sharing systems are most beneficial as part of Mobility as a Service (MaaS) systems. Through collaboration with other shared mobility companies as well as public transport, bike sharing can be conveniently fit into existing mobility platforms through integrated ticketing and pricing.

### Problems to be solved

<b>Congestion</b>	<b>Air Quality</b>	<b>Climate Change</b>	<b>Collision</b>	<b>Parking Space</b>	<b>Inadequate physical activity</b>
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Congestion, air quality, climate change, collisions, parking spaces and inadequate physical activity are all ills affecting the quality of life of citizens. Bike sharing reduces land consumption and pollutant emissions by enabling trips that would otherwise be taken by private cars to be taken by shared bicycle transport. Even in urban areas that already have higher levels of cycling and walking, research supports that increased active travel substitutes for motorised travel – including cycling and e-biking – can substantially reduce mobility-related lifecycle CO<sub>2</sub> emissions ([Brand et al., 2021](#)). Rented shared bikes cover up to 10,000 kilometres a year and are therefore used more frequently than most private bikes.

## Benefits

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*Benefits show tangibly how implementation of a Solution can improve the city or place.*

Bike Sharing Systems have economic, environmental as well as social benefits.

### Main benefits

- Promoting sustainable private transport models
- Promoting sustainable behaviour
- Reducing use of fossils in public transport

### Potential benefits

- Creating new jobs
- Reducing use of fossils
- Reducing GHG emissions
- Promoting sustainable behaviour
- Improving social integration
- Reducing local air pollution
- Promoting active living
- Improving public transport accessibility
- Reducing need for travel
- Enhanced data collection

## Functions

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*Functions help you to understand what the products can do for you and which ones will help you achieve your goals.*

*Each solution has at least one mandatory function, which is needed to achieve the basic purpose of the solution, and several additional functions, which are features that can be added to provide additional benefits.*

### Mandatory functions

#### **Moving passengers by bike**

*Shared bikes in the system enable passengers to move around the city*

#### **Managing bike fleet**

*Products that manage and coordinate the bicycles of the fleet*

#### **Accessing service**

*Products that enable users to access the shared bikes (e.g. via an app or kiosk)*

#### **Providing adequate density/availability of bike sharing infrastructure**

*Planning to ensure bike share stations are close enough to each other and desired destinations*

### Potential functions

#### **Charging shared e-bikes**

*Infrastructure (e.g. integrated into a docking station) to provide charging to shared e-bikes*

#### **Informing customers about bike sharing**

*Products that inform the customer about the services (e.g. apps, websites)*

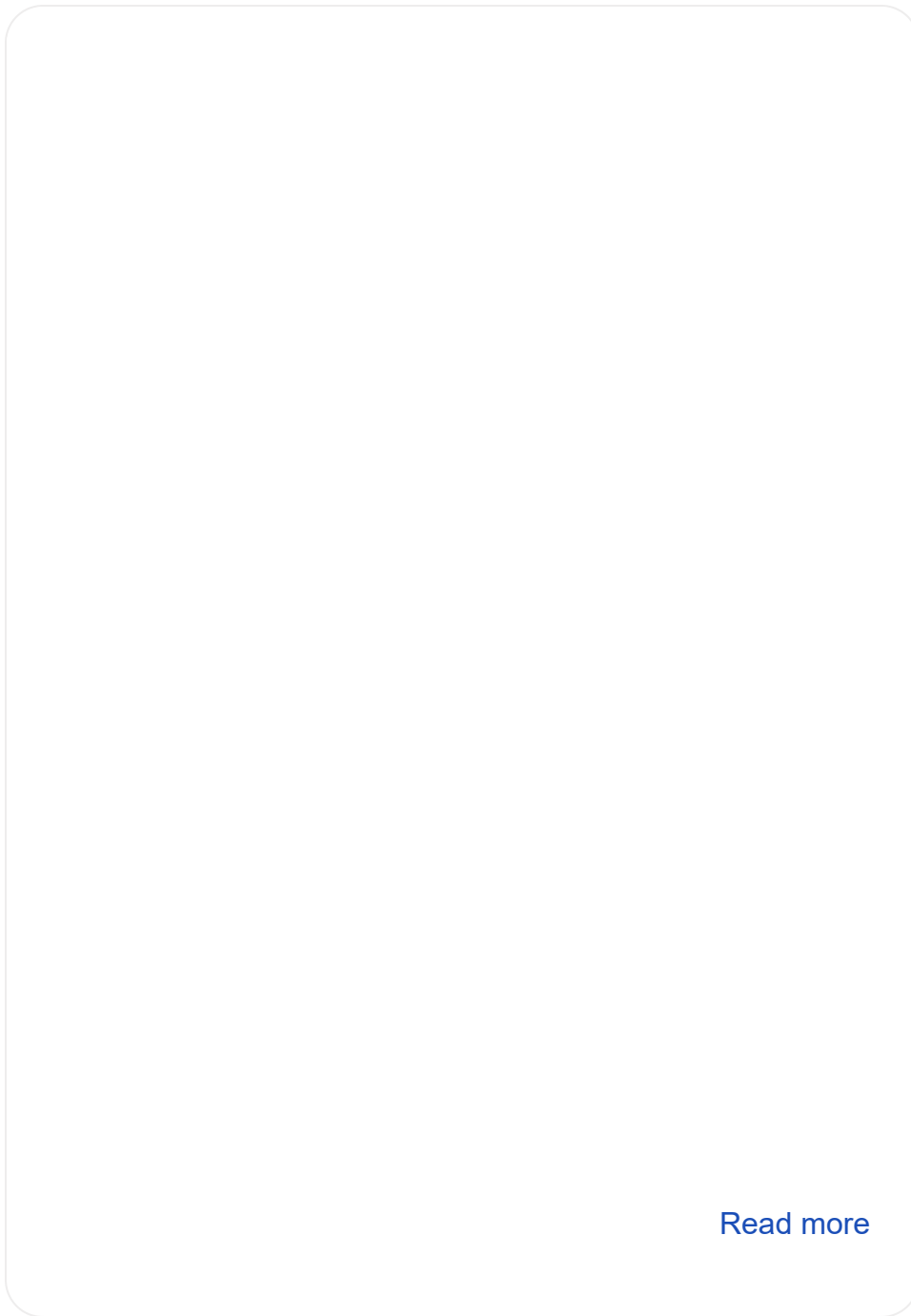
### **Connecting bikes of the shared system**

*Products and services (e.g. apps) that connect shared bikes with each other and to other transport modalities*

### **Paying for bike sharing**

*Services that enable payment for using the shared biked (e.g. distance- or time-based)*

## Products offering these functions



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## Variants

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*A variant is generally something that is slightly different from other similar things. In the context of Solutions, variants are different options or possibly sub-fields/branches by which the Solution may be implemented, e.g. different technological options.*

Bike sharing systems can differ in their implementation mainly based on the types of bike offered, sharing model provided and the ownership of the bikes.

Standard Bike Sharing

E-Bike Sharing

Cargo Bike Sharing

Dock-Based Bike Sharing

Free Floating (Dockless) Bike Sharing

Hybrid Bike Sharing

Economy-to-Peer Bike Sharing

Peer-to-Peer Bike Sharing

Company Bike Sharing

## Description

A standard bike share system is a shared transport service in which standard bicycles are available for individuals to book on a short term basis, either for a price or free. The transactions to rent these bicycles are normally done at a fixed station or via an app. Bikes can be borrowed from a station and returned either to the same station or another station within the same bike share system.

## Supporting City Context

- Sufficient locations and partners to create density of docking stations (if dock-based bikes are used)
- Adequate city planning and building permissions for docking stations (if dock-based bikes are used)
- Topography: flat landscape ideal (unless e-bikes are also included) , bike infrastructure – bike lanes, etc.

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## Legal Requirements

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*Relevant legal directives at the EU and national levels.*

- **EU-IVS-Regulation:** Ensuring data access as well as providing EU-wide multimodal travel information services and the provision of EU-wide real-time traffic information services ([Russ, Tausz, 2015](#))
- **Local measures are taken to keep streets organised / tidy from shared bicycles:**
  - Limits on the number of operators per city and fleet size per operator
  - Restrictions on parking locations and number of bikes per parking zone
  - Penalty fees for breaches of any kind
  - The requirement to install tracking devices on rental bikes
  - Immediate disposal of damaged rental bikes
- **EU Green Deal:** The EU 'Green Deal' includes a Sustainable and Smart Mobility Strategy intent on doubling the cycling infrastructure, which could add momentum to the already rapidly growing interest in bike sharing systems ([Bike Europe, 2021](#)).

## Operating Models

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*Which business and operating models exist for this Solution? How are they structured and funded?*

Within the currently implemented bike sharing systems, there are different revenue models. Some public bike sharing systems are implemented with a **non-profit strategy**. These usually intend to affect the consumers' behaviour. The government, transport agencies, universities or not-for-profit organisations typically implement such non-profit bike sharing systems. Implementations of a **profitable business model** are applied by advertising companies or by companies who intend to gain profit from the implementation itself. Advertising companies aim to take advantage of the visibility of the bikes in the city and the user community. However, for-profit companies gain a financial benefit from the bike sharing system itself and its fees ([Winslow and Mont, 2019](#)).

*Operating Models of a Bike Sharing System (BABLE, 2021)*

## Cost Structure

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### *Required Ressources of a Bike Sharing System (BABLE, 2021)*

### *Costs Structure of a Bike Sharing System (BABLE, 2021)*

The expenses of a bike sharing system consist of relatively high investment costs for the fleet of bikes and rather low variable costs. The costs for station installation are particularly high, accounting for about 70% of fixed costs. Redistribution cost is an important variable cost component and accounts for almost 30% of operating costs. The following tables provide an overview of the different emerging costs and a price range for each of these costs ([Frost and Sullivan, 2016](#)).

### *Estimated Costs of a Bike Sharing System (BABLE, 2021)*

## Market Potential

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*How big is the potential market for this Solution? Are there EU goals supporting the implementation? How has the market developed over time and more recently?*

**Market size:** The bike-sharing industry has been steadily growing over the past years. IT technologies and innovative business models ease the implementation of bike sharing systems. According to a market forecast conducted by Prescient & Strategic Intelligence the global market value in 2018 with 2.8 billion USD. Until 2025 an annual market growth rate of 10.2 % is expected. This results in a global market size of 5 billion USD by 2025, with Europe expected to be the fastest-growing market ([PS Market Research, 2019](#)).

**Market development:** The European bike-sharing market, in particular, is expected to grow at a compound annual growth rate of **9.4 %** during 2015–2025, from 139,090 bikes in 2015 to more than **340,000 bikes by 2025**. The number of users is expected to more than double by 2025 ([Frost and Sullivan, 2016](#)). Since the summer of 2017, dockless bike sharing models have also entered the European market, first starting with Chinese operators and now also supplied by several European companies and start-ups ([European Bicycle Manufacturers Association, 2021](#)).

**Potential customers:** Bike sharing is especially useful in densely populated areas where the market is already wider for more customers and these customers are in turn more incentivised to use the system, e.g. through denser networks of stations that are more convenient to meet their needs. Bike sharing is also a popular option among tourists as a way to see a city as well as in university / student-populated cities.

## Stakeholder Mapping

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*Which stakeholders need to be considered (and how) regarding the planning and implementation of this Solution?*

 Stakeholder map for bike sharing system solution

*Stakeholder Map of a Bike Sharing System (BABLE, 2021)*

## Government Initiatives

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*What efforts and policies are local/national public administrations undertaking to help further and support this Solution?*

Many European countries have a national cycling strategy. These strategies help to improve the cycling modal share by allowing federal authorities to mobilise the different stakeholders involved in the promotion of cycling. Some examples of national cycling strategies are:

- **Germany, National Cycle Plan 3.0:** will replace the National Cycling Plan 2020, which aims to achieve a 15% cycling modal share in Germany by 2020. Priority areas for the new 3.0 plan include cycling as a means to tackle climate change and protect the environment with goals to continue increasing cycling as a share of total traffic
- **France, PAMA (Action plan for soft mobility – Walking and cycling):** aims to encourage cycling by giving fiscal incentives to people who cycle to work
- **Ireland, Irelands First National Cycle Policy Framework:** aims to achieve a cycling modal share mark of 10% by 2020, up from 2% in 2006. This includes policies related to fiscal incentives, the provision of bikes and other indirect tax benefits.
- **Norway, National Cycling Strategy - Get on Bikes!:** aims at achieving 8% cycling modal share in Norway by 2023, by focusing on funding, infrastructure and communication. ([Frost and Sullivan, 2016](#))

Currently, there is no official EU Cycling Strategy. However, with the support of numerous other organisations, the European Cyclists' Federation (ECF) developed its own strategy and set of recommendations in 2017, with many seeing a need for more coordinated cycling action within the EU ([European Commission, 2021](#)).

## Supporting Factors

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1. **High-density network:** Highly concentrated and comprehensive networks of bikes and widespread program coverage ensure high accessibility.
2. **Multimodal integration:** Integration of infrastructures, information structures and payment with other mobility services enables convenient transfers (i.e. MaaS).
3. **Simple handling:** User-friendly, on-demand registration increases usability and reduces entry barriers for new users.
4. **Smart data analytics:** The use of data-driven applications optimises pricing and operations while creating additional revenue streams.
5. **High-quality bikes:** Easy-to-ride but also sturdy and weatherproof bikes ensure a comfortable riding experience and reduce maintenance costs.
6. **Support of local authorities:** Support of local authorities (e.g. in terms of bike lanes) and accessibility of public spaces and links to public transport can boost success.

## City Context

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*What supporting factors and characteristics of a city is this Solution fit for? What factors would ease implementation?*

### 1) Size of the city:

There is no significant difference between the modal shares of cycling in small, medium and large cities (i.e. the percentage of trips made by bicycle versus via other forms of transport).

- **Differences in technology:**
  - Large cities: technologically advanced schemes, more slots and bikes per station for automated schemes
  - Smaller cities: low-tech schemes
- **Operational hours:**
  - Large cities: tend to provide a 24-hour service for operation
  - Smaller cities: tend to close the service during the night
- **Pricing model:**
  - Small and medium-sized cities have schemes that are free of charge for at least 30 minutes (75% and 82%, respectively), while in large cities only 60% offer the first half hour for free (**OBIS project, 2011**).
  - Most systems provide multiple levels of user fees and tickets, ranging from tickets per hour (or partial hour) or day up to monthly or yearly subscription memberships. To lower losses due to potential bike theft, often users must commit a temporary deposit via credit/debit card or tied to their subscription contract.
  - Many major cities around Europe have signed contracts with private advertising agencies, which supply the city with free (or low-cost) bikes in exchange for advertising rights both on the bikes themselves and related bike share infrastructure.
  - While some cities have and do operate bike sharing as a public service (i.e. paying for the initial investment and operating costs), others also take advantage of national government grants or ongoing subsidies. Public-private partnerships (including through advertising agreements) also support many bike share systems.

### 2) Climate of the city

*Local climate is an important influencing factor for cycle usage in different seasons.*

- During the cold season, the bike sharing system demand can be influenced not only by the weather itself but also by cycling infrastructure conditions (e.g. whether snow and ice have been cleared).
  - In times of the year when usage is lower, the operator could limit the availability of bikes or even close down the system for maintenance. At times of the year when demand is high, additional staff and maintenance activities might improve service quality.

### 3) Infrastructure

Existing cycleways ease the usage of bikes and increase safety for riders, but in some cities where bike-sharing systems have been implemented so far, the increased bike usage also made the municipality improve the cycling way and the related infrastructure (**ADFC, 2019**). In

general, whichever direction of development, having a higher density of bike sharing infrastructure and available bikes can promote increased bike share uptake and use. Aside from providing infrastructure, bike share system operators and municipalities can also support systems by providing safety equipment (e.g. built-in lights on bicycles) and making efforts to limit / target vandalism to bikes.

#### 4) Topography

Including e-bikes in the bike sharing system is especially beneficial in hilly cities and suburbs of cities where people take bikes to move longer distances towards the city centre.

## Data and Standards

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*Which relevant standards, data models and software are relevant to or required for this Solution?*

- Data model: **General Bikeshare Feed Specification (GBFS)**
- Standards: **ISO 20614:2017**
- Required Software Functions:

*Required Software of a Bike Sharing System (BABLE, 2021)*

## The creation of this solution has been supported by EU funding

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 864242

**Topic: LC-SC3-SCC-1-2018-2019-2020: Smart Cities and Communities**

# Use Cases

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