

Bike Sharing/Public Bikes: An Overview of Programs, Vendors and Technologies

Bike share programs can provide safe and convenient access to bicycles for short trips, such as running errands during lunch and transit-work trips. The international community has experimented with bike share programs for nearly 40 years. Until recently, bike share programs worldwide have experienced low to moderate success; in the last 5 years, innovations in technology have given rise to a new (third) generation of technology-driven bike share programs. These new bike share programs can dramatically increase the visibility of cycling and lower barriers to use by requiring only that the user have a desire to bike and a credit card or phone.

Bike share programs, such as systems in Paris and Lyon, France, help increase cycling mode share, serve as a missing link in the public transit system, reduce a city's travel-related carbon footprint and provide additional 'green' jobs related to system management and maintenance. In the US, many cities are looking into bike share programs, though they have not yet been widely implemented. These systems are not foolproof; poor design, insufficient supply or improper placement of bicycles and a lack of maintenance are among the potential pitfalls faced when building and implementing a bike share system.

Existing and proposed bike share programs employ a wide variety of technologies, and "lessons learned" are being continually applied to new systems. For a bike program to be successful it is important that the correct technology and package of services involved be mated to the unique challenges that each program faces. For this reason it is strongly recommended that each agency considering implementation of a bike share program have an **independent assessment** of community needs, economics, technologies, logistical issues, service area, and other challenges faced in an implemented system.



Fleet bikes such as this one in Lyon, France can include a number of innovative features.

Overview of Existing Bike Share Program Elements

Technology-driven bike share programs have many common elements including equipment and systems (e.g., bike fleets, parking and locking mechanisms, user interface and check-out protocols, and station networks), as well as maintenance and management requirements (e.g., fleet and station maintenance, status information systems and bicycle redistribution systems).

Equipment and Systems

Bike Fleet

Fleet bikes should be distinctive, designed for easy city use, and be clearly branded to increase their visibility. Bikes typically come with full fenders, chain guards and, in some cases, bike locks. Most bikes come equipped with a Global Position System (GPS) unit, Radio Frequency Identification (RFID) tag, or other type of tracking mechanism. This function is typically used in fleet management and retrieval of lost or stolen bikes, which remains a common problem despite anti-theft technology.

Parking and Locking Mechanisms

Two major types of locking technology, both fully automated, are available:

1. Bikes lock to either a rack or kiosk where users collect and drop bikes, often using smart cards that contain the user's registration and payment information. Smart card systems are found throughout the world. These systems are generally simple to operate, making them accessible to the general public.
2. Bikes are secured using an electronic lock mounted on the bike. The customer calls the telephone number given on the bike and gets by voice the 4 digit unlock code, which he then types into the bike's touch screen to release the bike. This is commonly referred to as a dial-a-bike, or call-a-bike system. These systems are found predominately in Germany.



Fleet bikes, such as those in Germany's Deutsche Bahn system should be easily distinguishable.

Call-a-bike check-out requires very little infrastructure as the necessary mechanisms are mounted on the bike itself. Stations using smart card systems generally require:

- A bar, post or other physical structure to lock bicycles between uses
- A computerized system to check bicycles in and out
- A power source to control check-in/check-out and track bicycles



The Washington D.C. bike share program uses smart card technology.

Station Design, User Interface and Check-in/Check-out Protocols

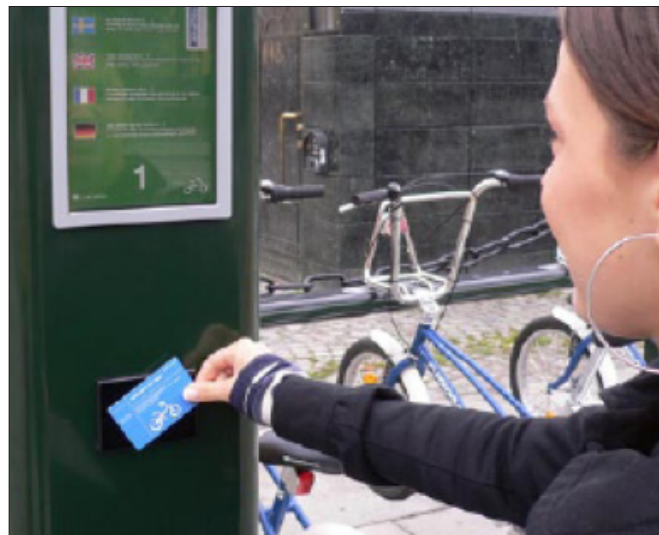
All bike share programs require a user interface to collect and retrieve bicycles, through a check-in/check-out system. The interface should be simple and easy to understand. Stations should provide clear directions on how to access and return a bicycle. Other recommended elements and design guidelines include:

- Instructions on where and how to return bicycles
- Cost and pricing information
- Contact information to report damaged bikes or stations
- Maps of nearby stations and recommended bicycle routes
- Damage resistant locking mechanisms
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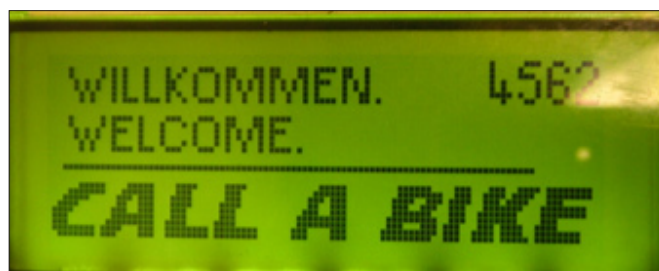
Both system styles may require the user to register prior to bike check-out. Any registration process and related technology should be well thought-out and intuitive. The best systems will offer multiple options to register and pay for bike check out (e.g., smart card or credit card.) To encourage casual and tourist use, registration should be quickly and easily handled at each check-out station. Requiring preregistration can create a barrier to entry, but will likely increase rider accountability and reduce bike theft.

Smart card systems allow quicker, more convenient bicycle access as users are not required to make a phone call in order to check bikes in or out. The major advantage of this system is the reasonable guarantee of finding a bike at any station.

Call-a-bike systems require the user to know and plan for the need to place a phone call in order to unlock the bike, but allow increased flexibility in terms of return locations and provide the ability to temporarily secure the bike during the rental period. The major advantage of this system is the ability to return the bike at any location.



Check-in/check-out procedures at a smart card kiosk. Instructions are available in several languages.



Call-a-bike check-out, is accomplished in part by phone but also operates via an automated user interface.

Maintenance and Management

A key aspect of any bike share program is system and fleet maintenance and management. These activities can help to ensure the bike share system is in top operating order and sufficient bikes are available to accommodate all users. To ensure that bicycles are available at all stations, it is likely that bicycles will have to be redistributed from one station to another consistently. Past performance of systems in Lyon and Paris indicates that many locations experience peak times of business when a rack will be either completely full or completely empty, making the rental or return of bikes impossible. Information about bicycle demand should be gathered through GPS units, Radio Frequency Identification (RFID) tags and any other means used to track bicycle locations.

Bike fleet maintenance includes common activities such as filling tires with air and ensuring that bike gears shift smoothly. Station maintenance may include repairing lock mechanisms, replacing damaged interfaces, and installing new power sources.

Safety and Liability

Even bike share systems kept in good repair can create safety and liability issues for system operators. System operators should consider requiring users to sign a liability release waiver and consider providing helmets with each bike, even if their use is not required by law.

Cost, Funding and Operational Models

Costs associated with bike share systems fall into four categories:

- Direct capital costs (e.g., bikes and terminals)
- Direct operating costs (e.g., administration, maintenance, and electricity to power terminals)
- Associated capital costs (e.g., construction of the system for building the necessary infrastructure and streetscape improvements)
- Associated operating costs (e.g., maintenance of docking infrastructure and the existing bikeway network, insurance costs)

It is common for a public agency to undertake operation of a bike share system with an operating partner, as most bike share systems are not financially self-sustaining. Funding for public bicycle systems commonly comes through a combination of advertisements, user fees, and public government funds and operates as a public-private partnership.

City	Barcelona	Paris	Berlin	Washington D.C.
Service Provider	ClearChannel Outdoor	JC Decaux	Deutsch Bahn	Clear Channel in partnership with District DOT
Number of bicycles	5,000	20,600	1,700	120
Check out system	Card	Card	Phone	Card
Cost	Preregistration via mail and purchase of an annual subscription for €24. First half-hour is free. Additional half-hours are priced at €30.	A one-day card costs €1, a weekly card for €5 or an annual card for €29. First half-hour is free. Additional half-hours are priced at €1, €2 and €4.	.06-.08 Euro Cents/Minute. Preregistration is required	Preregistration is required. Annual membership fee

Recommended Independent System Evaluation

To assist public agencies in the selection of the optimal bike share program, it is highly recommended that an independent evaluation and assessment be conducted before selecting the bike sharing operator or vendor. The independent evaluation steps are recommended:

Examine Need

It is important to have a thorough understanding and basis for the development of bike share program before undertaking capital expenditures. Such background information includes the following questions:

- What is the rationale for a bike share program?
- What are the objectives of a bike share program?
- What would constitute a successful bike share program?
- What risks are involved?
- Are there any specific strategies or technological requirements that are needed?

Document International/Domestic Experience & Best Practices

Once the specific needs of a bike share program are understood, it is advisable to compare existing bike share systems around the world against each other and the needs and objectives of the desired program. This process involves examining case studies from around the world, noting technology employed, system size, and operational characteristics. Only once a thorough understanding of the strengths and weaknesses of other systems are taken into account can successful planning begin.

Develop Business Strategy

Choosing a business strategy customized to the needs and challenges of each bike share program will factor heavily in its success. In this stage of program evaluation the following are considered:

- Anticipated usage – forecast bike share program usage and revenue generation
- Economic analysis – true long term costs, financing models, subscriptions & user fees; general revenues; outdoor advertising rights; sponsorship; revenue generation
- Fare structure & pricing – payment methods; cash; credit card; smart cards; user accountability
- Operating model and impacts for each model – agency to own & operate; agency to own but private company operate; private company owns & operates

Select Bike Share Program System

After careful consideration of the above characteristics, the process of selecting a vendor, technology, and system size can begin. In this stage the following system elements are determined:

- Number and type of bicycles in system – will system grow over time?
- Type of parking/storage system (revenue collection and bicycle access system)
- Locations of parking/storage systems
- System maintenance and administration