

1. Introduction

Purpose of this Report

The City of Seattle Department of Transportation (SDOT) contracted the University of Washington Bike-Share Studio to produce a feasibility study of bike-share programs in Seattle. Over the course of this project, we compiled a summary of the leading edge bike-share programs; conducted demand analyses to identify potential first-, second-, and third-stage implementation areas in Seattle; and estimated the number of trips a program might generate, as well as the number of bicycles and stations necessary to sustain such a program.

In addition, we identified potential system elements for a Seattle bike-share program and reviewed the relevant regulation, policies, and plans that could affect implementation of a bike-share program in Seattle. This report summarizes our findings, provides recommendations for implementing a bike-share program in Seattle, and identifies areas for future study.

Defining Bike-Share

Public use bike-share—shortened for the purposes of this report to “bike-share” or “bike-sharing”—can be defined in a couple of ways. The first definition describes bicycles that are intended for short-term use by the public and that are available for check-out at unattended urban locations. The second and broader definition of bike-share is public transportation via bicycle. These two definitions are not mutually exclusive and are best thought of in combination. Bike-sharing was designed to increase mobility in urban settings by offering the user one-way, short-distance transportation between point A and point B, with little to no stopping in between.

The trip begins with a user checking out a bicycle at a station near his/her point of origin. Once the user has reached his/her destination, the bicycle is checked in, or docked, at or near the destination. Though “automated” check out and check in are similar to car-sharing, unlike car-sharing, bike-share bicycles can be returned to any station within the system. Furthermore, the unique pricing structure of bike-share (discussed later) encourages short-term use of 30 minutes or less. This differentiates bike-share from private bicycle rental companies that typically rent bicycles for hours—or even days—at a time.

Bike-sharing was designed to increase mobility in urban settings by offering the user one-way transportation between point A and point B, with little to no stopping in between.

History

Bike-share experts typically cite three generations of bike-share programs over

the past 45 years.¹ Figure 1 on the following page illustrates each of the three generations of bike-share. The first generation began in Amsterdam in the mid-1960s with the introduction of the White Bike program. White Bikes were ordinary bicycles painted white and left about the city for the public to use free of charge. Within days the program collapsed from overwhelming rates of theft and vandalism.² Since Amsterdam's White Bikes, other first-generation programs have been attempted in cities such as Portland, Oregon, and Boulder, Colorado. Regardless of the year of inception, nearly all first-generation programs have met a similar fate: failure resulting from high rates of theft and vandalism.³

In 1995, the first large-scale, second-generation bike-share program was launched in Copenhagen, Denmark. Bycyklen ("City Bikes") featured many improvements over the previous generation.⁴ The most notable improvement was a check-out method that required a small coin deposit. Unlike Amsterdam's White Bikes, the Copenhagen bicycles were specially designed for intense utilitarian use and could be picked up and returned at designated locations throughout the central city. While more formalized than the previous generation, with stations and a non-profit organization to operate the program, the bicycles still experienced theft attributed to the anonymity of users.⁵ Bycyklen is one of the few second-generation programs that still operates today, but it is most well known for the role it played in giving rise to third-generation bike-share.

Building upon the innovation of coin-deposit locking mechanisms, third-generation programs gained worldwide popularity by incorporating advanced technologies for bicycle reservations, pick-up, drop-off, and information tracking.⁶ The earliest identified third-generation bike-share program was Bikeabout, created in 1996 at Portsmouth University in England.⁷ This program allowed students to use a magnetic stripe card to rent a bike.

Bike-sharing grew slowly in the following years, with one or two third-generation programs launching annually. These include 1998's Vélo à la Carte in Rennes, France, and 2005's Velo'v, launched by JCDecaux in Lyon, France. With a fleet of 1,500 bicycles, this was the largest third-generation bike-share program to date and grabbed the attention of other European cities.

Two years after the launch of Lyon's ground-breaking program, Paris launched its own bike-share program, Vélib', with approximately 7,000 bicycles. Vélib' has since expanded to 20,600 bicycles, quickly becoming one of the largest and most publicized bike-share programs. However, the publicity was partially the result of extremely high rates of theft and

1 Paul DeMaio, "Bike-sharing: Its History, Models of Provision, and Future," in Velo-City Conference (Brussels, 2009).

2 Ibid.

3 Susan Shaheen, Stacey Guzman and Hua Zhang, "Bikesharing in Europe, the Americas, and Asia: Past, Present, and Future," in Transportation Research Board Annual Meeting (Washington, D.C., 2010).

4 Paul DeMaio, "Bike-sharing: Its History, Models of Provision, and Future," in Velo-City Conference (Brussels, 2009).

5 Ibid.

6 Susan Shaheen, Stacey Guzman and Hua Zhang, "Bikesharing in Europe, the Americas, and Asia: Past, Present, and Future," in Transportation Research Board Annual Meeting (Washington, D.C., 2010).

7 Paul DeMaio, "Bike-sharing: Its History, Models of Provision, and Future," in Velo-City Conference (Brussels, 2009).

Figure 1: Photos of 1st, 2nd and 3rd Generation Bike-Share



1st Generation Bike-Share Photo
<http://www.happyhotelier.com>



1st Generation Bike-Share Photo
<http://wanderlustandlipstick.com>



2nd Generation Bike-Share Photo
<http://umebike.wordpress.com>



3rd Generation Bike-Share Photo
Max Hepp-Buchanan, 2009



3rd Generation Bike-Share Photo
Max Hepp-Buchanan, 2009



3rd Generation Bike-Share Photo
Max Hepp-Buchanan, 2009

vandalism. Since the inception of Vélib' in July 2007, nearly 80 percent of the program's initial fleet of bicycles has been either stolen or damaged beyond repair.⁸

The four main components of third-generation bike-share programs are summarized as follows:

1. Distinguishable bicycles (either by color, special design, or advertisement)
2. Docking stations
3. Kiosk or user interface technology for check-in and checkout
4. Advanced technology (e.g., mobile phone, magnetic strip card, smartcards)⁹

Furthermore, each rental is often accompanied by a large monetary deposit secured by the user's credit card.

Incorporation of third-generation information technology was meant to help deter bicycle theft, which was a major concern of second-generation coin-deposit systems. Clearly, third-generation technology is not entirely successful at preventing theft and vandalism. Despite this continued problem, however, 92 programs, large and small, operated across the globe at the end of 2008. By the end of 2009, that number was approximately 160, an increase of 74 percent.¹⁰

Table 1 is a reference guide to the bike-share programs that we commonly refer to throughout this report.

Table 1: Bike-Share Programs

Program Name	City	Generation	Year Created	Operator	# of Bikes	# of Stations
White Bikes	Amsterdam	First	1965	Public	Unknown	None
Bycyklen	Copenhagen	Second	1995	City of Copenhagen	2,000	110
Vélo à la Carte	Rennes	Third	1998	Clear Channel	200	25
Velo'v	Lyon	Third	2005	JC Decaux	4,000	340
Vélib'	Paris	Third	2007	JC Decaux	20,600	1,425
Bicing	Barcelona	Third	2007	Clear Channel	6,000	400
SmartBike DC	Washington, D.C.	Third	2008	Clear Channel	120	10
Bixi	Montréal	Third	2009	Public Bike System Co.	5,000	370

The availability of technology and the emergence of many competitors is leading to a marketplace in which incremental advances quickly spread throughout the industry.¹¹ In fact, some experts assert that bike-share is already seeing the emergence of fourth-generation

8 Steven Erlanger, "French Ideal of Bicycle-Sharing Meets Reality," *The New York Times*, October 30, 2009, New York Edition ed.: A1.

9 Susan Shaheen, Stacey Guzman and Hua Zhang, "Bikesharing in Europe, the Americas, and Asia: Past, Present, and Future," in *Transportation Research Board Annual Meeting* (Washington, D.C., 2010).

10 Paul DeMaio, "Bike-sharing: Its History, Models of Provision, and Future," in *Velo-City Conference* (Brussels, 2009).

11 Ibid.

systems. Since the introduction of the first third-generation programs, advancements have been made in methods of check-out and check-in, ease of use, flexibility of station placement, tracking of bicycles and mileage, bicycle and station design, powering of supply stations, incorporation into other modes of transport, distribution, business models, and theft deterrence.

As an example, the Bixi program in Montréal uses “modular,” solar-powered stations that are not installed into the street infrastructure. Bixi stations are dropped into place and secured by their weight. Subsequent adjustments to station size or location based on actual demand and use patterns are easier to make than changes to models that require street installation or hardwiring to existing infrastructure.

Status of Bike-Share in the United States Today

The first bike-share program to exist in the U.S. was Smartbike DC, initiated in 2008. Clear Channel operates the program with 120 bicycles and 10 stations as part of an outdoor advertising contract with Washington, D.C. Denver also has a small bike-share program called B-Cycle, which started with 30 bicycles for city employees. Through the summer of 2009 B-Cycle expanded significantly. Its goal is to have 1,000 bicycles and 70 stations on the street by the summer of 2010.¹²

Minneapolis appears to be the next city to host a bike-share program. NiceRide is scheduled to launch in spring 2010 and will be operated by Public Bike System Company, the same non-profit that operates the Bixi program in Montréal. The program is planning to start with 1,000 bicycles. The system will be seasonal; bicycles will be removed during the winter because of heavy annual snowfall.¹³

Boston released an extensive and detailed request for proposal (RFP) for a bike-share vendor and operator in spring of 2009.¹⁴ That summer, the Metropolitan Area Planning Council announced that it had also selected Public Bike System Company to operate its program. Like Minneapolis, Boston expects to launch in spring of 2010, but with a slightly larger fleet—1,500 bicycles and 150 stations.¹⁵

The most recent city in the U.S. to show interest in bike-share is Philadelphia. In late 2009 a paper was released that discusses the methods and findings of a two-phased project to identify a primary geographic market area for a bike-share program. The paper endeavored to estimate daily bike-share trips in the city's prima-

12 DeMaio, Paul. The Bike-sharing Blog. January 14, 2009. <http://bike-sharing.blogspot.com/2009/01/denver-is-mile-high-on-bike-sharing.html> (accessed March 5, 2010).

13 JzTI and Bonnette Consulting. Philadelphia Bikeshare Concept Study. Philadelphia: Delaware Valley Regional Planning Commission, 2010.

14 Metropolitan Area Planning Council. Request for Proposals - Bicycle Sharing System. RFP, Boston: Metropolitan Area Planning Council, 2009.

15 City of Boston. “Mayor Menino, Boston Bikes Announce Request for Proposals for Bike Share Program.” City of Boston.gov. March 3, 2009. <http://www.cityofboston.gov/news/default.aspx?id=4122> (accessed March 5, 2010).

ry market area.¹⁶ The methodology discussed in the Philadelphia paper informed the methodology presented in this report. A more detailed consultant report on the bike-share feasibility study for the City of Philadelphia was released in February 2010.¹⁷

Benefits

Transportation planners and bike-share experts generally agree about the benefits of bike-sharing in urban settings.¹⁸ These benefits can be separated into two general categories: 1) benefits to the city/region and 2) benefits to the user/society (with some overlap).

Transportation benefits to the city/region include the following:

- Does not create pollution, or contribute to global warming
- Does not add to congestion
- Is less expensive to purchase and maintain than other modes (rail, bus, auto)
- Requires less infrastructure investment than other modes
- Allows low-cost expansion of existing transportation services
- Promotes greater transit use through modal integration

Transportation benefits to the user/society include the following:

- Provides low-cost, on-demand transportation (typically offered 24 hours a day, seven days a week)
- Serves as the “final mile” of commute
- More bicycles on the road increases the safety of other cyclists
- Offers physical exercise for the user
- Makes a city more livable and neighborly

The introduction of Velo’v in Lyon offers a good case study of some of the benefits of bike-sharing in urban settings. In a relatively short timeframe Velo’v drastically changed the

16 Krykewycz, Gregory R. et al. “Defining a Primary Market Area and Estimating Demand for a Large-Scale Bicycle Sharing Program in Philadelphia.” TRB 2010 Annual Meeting. Washington, D.C., 2009.

17 JzTI and Bonnette Consulting. Philadelphia Bikeshare Concept Study. Philadelphia: Delaware Valley Regional Planning Commission, 2010.

18 Eric Britton, “Public Bikes in Latin American Cities: Great idea but what next?” (Cuernavaca: World Streets, July 2, 2009).

Bike-sharing provides a low-cost geographical expansion of existing transportation services, providing a means to complete the “final mile” of one’s commute.

image of cycling in Lyon, which had never been known as a bike-friendly city. For many years, the mode share for bicycles was 0.6 percent, but in 2006, 1.8 percent of all trips were made by bike. In only one year, Velo'v riders had essentially tripled the share of trips made by bicycle. Even more significant is the fact that Velo'v has proved that traveling by bicycle in Lyon is credible.¹⁹ Traffic crossings at intersections have increased by 80 percent for bicycles, one-fourth to one-third of which are Velo'v users. The increased number has also changed the behavior of drivers, who have no choice but to accept the presence of cyclists.²⁰

These increases raise the question, "Who are bike-share users?" As a general rule, bike-share should be aimed at residents and tourists alike. Bike-share can be targeted toward both men and women, regardless of race, class, or age (though, for liability reasons, they may need to be 18 or over). Unfortunately, bike-share may not be right for those who are somehow mobility-impaired or handicapped.

Some new bike-share users will likely substitute bike-share trips for trips they would have otherwise made on foot or by bus. Ideally, however, people will recognize that between bike-share and local/regional transit (most likely a combination of both), many car trips can be replaced by these alternative and sustainable modes of travel.

Structure of the Seattle Bike-Share Feasibility Study

Chapter 2 outlines the methodology and findings of our demand analysis. This includes proposed Phase 1, Phase 2, and Phase 3 implementation areas, as well as estimates for the number of bicycles and stations for each phase. Chapter 3 is our policy framework, which discusses potential system elements for a bike-share program in Seattle. Chapter 3 also identifies and analyzes city/regional plans and policies that may have an impact on bike-share planning and implementation in the city. Chapter 4 condenses the discussion in chapters 2 and 3 into a bulleted list of our key findings and recommendations for the City of Seattle. It concludes with a summary discussion of how the demand analysis findings and the policy implications relate to each other, if at all.

Throughout the report, key findings and recommendations will be made, although all of them can be found in one location in Chapter 4. As you read, please note:

- ❖ All recommendations can be identified by use of a diamond-shaped bullet.
- All other points (key findings, etc.) will use a simple black dot bullet.

19 Keroum Slimani, interview by Max Hepp-Buchanan, Lyon and Velo'v, (September 3, 2009).

20 Ibid.