



How accessible and convenient are the public bicycle sharing programs in China? Experiences from Suzhou city



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ABSTRACT

Many cities in China have implemented public bicycle sharing programs as a strategy to promote low-carbon transportation policy. Suzhou is one of them. Today, 12,840 bicycles are in operation in 548 bicycle docking stations in the city. This research investigates how accessible and convenient the Suzhou bicycle sharing program is to those who are marginalized and have low income, less education and rely on irregular and low paid jobs, and what could be done to improve the accessibility and quality of the service. Since no studies have been carried out on the Suzhou public bicycle sharing program, this study is the first to make a contribution on the subject. The results showed that very few females, low-income migrant workers and less-educated people were taking advantages of the program. Most bicycle users reported that the bicycle docking stations were inconveniently located and bicycle parking slots were not available when needed in the stations. This warrants making the program more accessible and convenient to the weaker section of the society through bottom-up participatory planning process.

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1. Introduction

Bicycle ownership in China dropped sharply in the mid-1990s with the rise of income, surge in automobiles and expansion of highways (Zhang, Shaheen, & Chen, 2014). China is already the number one in CO₂ emission in the world, and number two in terms of the volume of gasoline imports (Wang, Teter, & Sperling, 2011). Automobiles contributed to 25 percent of the PM_{2.5} emissions in Beijing in 2013 (Xinhua, 2013). Lung cancer rose from 18 to 28 percent in Beijing between 1997 and 2003 (Li, 2009). Many other cities are on the verge of a similar situation, and public frustrations about urban air pollution are on the rise. The Chinese government took note of this problem in 2011 and set a target to reduce carbon emissions per unit of GDP by 17 percent by 2015 (The National Development and Reform Commission of the People's Republic of China, 2012). Concurrently, the Ministry of Transport initiated a public bicycle sharing program (PBSP) as one of the strategies to meet the target. This paper evaluates the PBSP implemented in Suzhou, China in 2010. It investigates how accessible and convenient the Suzhou bicycle sharing program is to those who are weak,

have less income, less education and rely on irregular and low paid jobs, and what could be done to improve the accessibility and quality of the service. Answering these questions could provide valuable insights to policymakers interested in making the bicycle sharing program more accessible and popular to the general public in China. The paper is organized as follows. First it introduces what the PBSP is. Second, it presents previous studies on the PBSP. Third, it explains the focus and purpose of this research. Fourth, it presents the research method. Fifth, it briefly introduces Suzhou city's PBSP. Sixth, it presents results and discussion. Seventh, it lays out policy recommendations followed by conclusions.

2. What is the PBSP?

PBSP is a short term urban bicycle rental scheme for traveling within a city from one docking station to another (Fishman, Washington, & Haworth, 2013; New York City Department of City Planning, 2009). It is convenient for short distance commuting for the 'last mile' trip, from home to a transit station, from work to a transit station and vice versa (Shaheen, Guzman, & Zhang, 2010). To use the PBSP bicycle, one needs to register and own a PBSP e-card. Once the card is tapped on the docking pole in a bicycle docking station (BDS) the bicycle is released from the pole for use. The same methods must be adopted when returning the bicycle to any

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docking station. A rider is freed from liability for the bicycle once it is parked in the docking station after use (Shaheen et al., 2010). In North America and Europe, the first 30 min are free and for every subsequent 30-min period a fee is charged (Shaheen, Martin, Cohen, & Finson, 2012). In most Chinese bicycle sharing programs, the first hour is free and after that a fee is charged for every additional hour.

The PBSP helps people to move from one transit station to another and enhances connections with other public transit modes (DeMaio, 2009). Shaheen et al. (2010), see the benefits of bicycle sharing to be a flexible choice of mobility, helping to reduce emissions, helping people to be physically active and healthy, reducing congestion and the use of fossil fuel, and offering relatively cheaper transportation option. Bicycle sharing could provide the 'last mile ride' opportunity to working populations and migrant-workers who commute daily from their residents to the public-transit or to construction sites, and vice versa.

The first generation of the bicycle sharing program began in 1960 in Amsterdam under the name "White Bicycle Program" (METROLINX, 2009). White painted bicycles were placed in different parts of city for free use. It was assumed that one could ride a bicycle up to his or her destination, leave it there, and the next person can use it for their own purpose (DeMaio, 2009). However, people did not use the bicycles as expected. Some took the bicycle home for their personal use; others threw them into the canals and ultimately the program failed. A second generation of bicycle sharing was attempted in 1995 in Copenhagen, Denmark. Under this scheme, people could use a bicycle from the designated bicycle stations in downtown Copenhagen with a coin deposit. The program was operated by a non-profit organization (DeMaio, 2009). At the designated stations one could unlock the bicycles for use with a 20 Danish Krone (US \$3) (Shaheen et al., 2010). The program had 1100 colored bicycles in operation in the city. However, this program had two weaknesses. First, there was no time limit for use. As a result people occupied the bicycles for a prolonged duration. Some of them never returned the bicycle (Shaheen et al., 2010). Second, because of the anonymity of the bicycle user, many bicycles were stolen and vandalized.

Next, third generation PBSPs were invented to avoid bicycle theft. In this generation, the riders were required to register with the bicycle program, pay a deposit, and acquire a smart card (Shaheen, Zhang, Martin, & Guzman, 2011). These riders then had to tap their cards on the docking pole to check-in or check-out bicycles from the docking stations. In Hangzhou, China, people pay a RMB200¹ deposit to register with the program and receive a smart card. The first hour ride is free, the second hour is charged RMB1, the third hour is charged RMB2 and RMB3 for all other additional hours (Shaheen et al. 2011). This system enables program operators to track bicycles, access user information and discourages bicycle stealing (Shaheen et al., 2012). Because of the third generation bicycle sharing system's ability to track, bill, and hold the users accountable, bicycle sharing programs have become popular and spread all over the world (Fishman et al., 2013).

The first 3rd generation bicycle sharing program in Europe was implemented in 1998 in Rennes, France (Midgley, 2011). As of May 2013, 204 cities in 36 countries have implemented a bicycle sharing program and 368,600 bicycles are in operation across 13,600 stations (Shaheen et al., 2012). Except for Africa, the programs are in operation on every continent. In China 104 cities and towns across China have adopted bicycle sharing systems in 2013 (Institute for Transportation and Development Policy, 2013).

According to Zhang et al. (2014), three business models for the

PBSP are at work in China. The first model is where local government provides land for bicycle stations (BS) and a state owned company manages the program. The company earns revenue through advertisements. Hangzhou's PBSP has adopted this model. The second model is where a private enterprise manages and provides bicycle sharing services, while the local government provides land for stations. The private enterprise collects revenue from advertisements and bill boards at the stations (Wuhan model). Finally, the third model is where a private enterprise manages and provides services, the local government provides funding, and both the agencies share the revenue generated through advertisements (Shanghai model).

3. Previous research on PBSP

A number of studies have been carried out on PBSP in North America and Asia but with different focuses. One group of studies has targeted the bicycle users' socioeconomic characteristics such as income, education and car ownership (LDA Consulting, 2012). Some have focused on how the bicycle programs have influenced residents public transit use behavior. Shaheen et al. (2012) and others have looked into the characteristics of people living nearby bicycle stations (Fuller et al., 2011; Ogilvie & Goodman, 2012). Some of key features of these studies are as follows.

LDA Consulting (2012) carried out a customer use and satisfaction survey of 5464 bicycle users of the Capital Bicycle Share Program (CBSP) implemented in Washington DC and Arlington County, Virginia in 2011. According to the survey, females accounted for 45 percent of the members (LDA Consulting, 2012). The survey did not examine the use pattern of migrant workers or immigrants living and working in the towns. Twenty-five percent of the members had income less than \$4000 per month and 75% were earning above \$4000, and those earning more than \$100,000 per month were 39%. More than nine in ten survey respondents were employed. Car owners accounted for 53% of the respondents.

Shaheen et al. (2012) carried out an online survey of 10,661 bicycle users from four bicycle sharing programs in North America from November 2011 through January 2012. They were: Montreal, Twin Cities (Minneapolis and Saint Paul), Toronto, and Washington, D.C. The survey found that 28% of the users had approximately less than \$4000 income per month, 66% had income above \$4000 and 39% had income over \$100,000. More than 85% of the sample was college educated. Data from Montreal, Toronto and Minnesota showed that 40 percent of the total sample said that they use their car less often after joining the PBSP.

Ogilvie and Goodman (2012) analyzed registration data for 100,000 members of the London bicycle share program and found that the bicycle users were disproportionately male, lived in pockets of relative affluence and had higher general cycling participation rates. They found that poor neighborhoods had a lower concentration of docking stations. Fuller et al. (2011) studied the bicycle sharing program in Montreal, Canada (BIXI) and found that men and women had the same likelihood of using BIXI. Most of them had tertiary education.

Shaheen et al. (2011) conducted an intercept survey of 660 members and 140 nonmembers of Public Bicycle Sharing Program in Hangzhou in China in 2010 to see the impact of the program on people's travel behavior. The authors found that approximately 30% of members had incorporated bicycle-sharing into their most common commute. About 80 percent of the respondents shifted from public transport to bicycle use, 50% from car use and 30% from taxi use. Members exhibited a higher rate of auto ownership than nonmembers.

Zhang (2011) carried out a survey of 200 bicycle users in 24 bicycle stations in the PBSP implemented in Wuhan, China. The

¹ 1 US dollar is equal to 6.1 RMB on July 23, 2015 exchange rate.

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