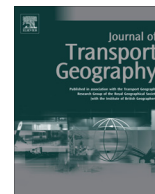




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Barriers to bikesharing: an analysis from Melbourne and Brisbane

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ABSTRACT

This study quantifies the motivators and barriers to bikeshare program usage in Australia. An online survey was administered to a sample of annual members of Australia's two bikeshare programs based in Brisbane and Melbourne, to assess motivations for joining the schemes. Non-members of the programs were also sampled in order to identify current barriers to joining bikeshare. Spatial analysis from Brisbane revealed residential and work locations of non-members were more geographically dispersed than for bikeshare members. An analysis of bikeshare usage in Melbourne showed a strong relationship between docking stations in areas with relatively less accessible public transit opportunities.

The most influential barriers to bikeshare use related to motorized travel being too convenient and docking stations not being sufficiently close to home, work and other frequented destinations. The findings suggest that bikeshare programs may attract increased membership by ensuring travel times are competitive with motorized travel, for example through efficient bicycle routing and priority progression and, by expanding docking station locations, and by increasing the level of convenience associated with scheme use. Convenience considerations may include strategic location of docking stations, ease of signing up and integration with public transport.

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1. Introduction

In 2010, Brisbane and Melbourne introduced bikeshare programs (BSPs) in their city centers and some of the local surrounding inner suburbs, known as *CityCycle* and *Melbourne Bike Share (MBS)* respectively. Bicycle riding participation has not increased significantly in either Brisbane or Melbourne between 2011 and 2013, with around 15–17% of the population riding at least once in a typical week (Austroads, 2013), although these aggregated figures may hide localized differences. Australia's bikeshare usage has not been as strong as anticipated (Brisbane Times, 2011; Fishman, 2012; Fishman et al., 2013; Fyfe, 2010), with usage

rates significantly less than other BSPs (Fishman et al., 2013; Meddin, 2011). Both schemes started with approximately 0.2–0.5 trips per day per bike. Usage has increased since launch but by the end of 2012, neither program had reached one trip per day per bike (Hoernel, 2013; Lundberg, 2013). Most other schemes internationally report usage rates of around 3–6 trips per bike per day (Fishman et al., 2013). There has been widespread speculation as to reasons behind the lower usage rates in Australian cities, yet relatively little empirical research has been conducted.

This paper sets out to examine two key questions. Firstly, what are the major factors acting as barriers to bikeshare membership in Australia? Secondly, what are the major motivators for bikeshare members to have joined Australia's two BSPs? These questions have been developed to help shed light on why Australia's bikeshare usage has been significantly lower than BSP in other countries.

Table 1 provides an illustration of some of the key metrics of the Brisbane and Melbourne BSPs. To offer context, three other BSPs have also been included.

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Table 1
Bikeshare program size and usage – selected cities. Sources: MBS bike and trips (Hoernel, 2013), CityCycle bikes and trips (Lundberg, 2013), Brisbane and Melbourne population (Australian Bureau of Statistics, 2013), London data (Greater London Authority, 2012; Stanhope, 2013; Woodcock et al., 2014), Washington, DC data (Capital Bikeshare, 2013; Wikipedia, 2012). All data 2012 unless otherwise stated.

	Brisbane (CityCycle) ^c	Melbourne (MBS) ^c	London ^c	Washington, DC ^c	New York City ^a
Bikes ^b	1800	600	8000	1800	6000
Trips (2012)	209,232	138,548	9,040,580	2,008,079	902,915
Trips per day per bike	0.3	0.6	3.1	3.0	5.2
Number of docking stations	148	50	571	191	331
Regional population	2,065,998	3,999,980	7,170,000	5,860,342	23,500,000
Annual members	1926	921	76,283	18,000	96,125
Operator	JCDecaux	Alta Bike Share	Serco	Alta Bike Share	NYC Bike Share

^a New York City data (NYC Bike Share, 2013; Wikipedia, 2014) from July 2013 to December 2013.

^b Fleet total for 2012 (2013 for NYC), which may not reflect actual number of bicycles in circulation.

^c Based on data from 2012. Trips less than 2 min or greater than 3 h have been excluded, as they are likely to have been the result of operator or technical error, and are unlikely to represent a genuine trip.

2. Literature review

This section provides a brief overview of some of the literature examining bikeshare. The first BSP began in Amsterdam in the 1960s, but theft and vandalism led to a rapid demise (DeMaio, 2009). Major technological developments now allow bikeshare operators to integrate payment, security and tracking technologies into their systems, mitigating many of the problems associated with early BSPs (DeMaio, 2009). The different stages of bikeshare development have led some researchers to define the stages as 1st, 2nd, 3rd and 4th generation (DeMaio, 2009; Shaheen et al., 2010). First and 2nd generation programs suffered from theft and vandalism due to user anonymity. These experience, as noted by DeMaio (2009) gave rise to what can be described as a 3rd generation BSPs, characterized by docking stations, automated credit card payment and other technologies, such as radio frequency ID tags and GPS. It is these elements that have contributed to the burgeoning bikeshare market worldwide (Shaheen and Guzman, 2011) and both Australian BSPs can be classed as 3rd generation, although Brisbane's BSP does not currently offer credit card swipe access. The growth in bikeshare has coincided with major technological developments and affordability of electric bikes. It is plausible that the next generation of bikeshare may include electric bikes and indeed there are some programs already offering 'e-bike share' (Ji et al., 2013).

The availability and affordability of these new technologies have combined with what Pucher and Buehler (2012) have identified as a growing enthusiasm for urban bicycling, leading to a rapid growth in this new form of public transport. Although constantly changing, there are now no less than 700 cities operating BSPs across the globe (Fishman et al., 2014), from small pilot programs through to those in Wuhan and Hangzhou, China with 90,000 and 70,000 bikes respectively (Larsen, 2013). The purported benefits of bikeshare have been identified by Shaheen et al. (2010) as flexible mobility, reduced emissions, increases in physical activity, congestion mitigation and fuel conservation, individual financial savings and support for multimodal transport connections.

Underpinning many of the benefits often associated with bikeshare is an assumption that many of the trips are replacing car use (Fishman et al., 2013; Midgley, 2011). In instances in which researchers have been able to ask bikeshare users what mode they are replacing, it is very often other sustainable modes of transport, that is, walking, public transit, or a private bike trip. For instance, Murphy (2010) found some 66% of the users of the Dublin BSP were substituting for a walking trip. In London and Washington, DC only 2% and 7% of users are substituting for car use (Fishman et al., 2014). Bachand-Marleau et al. (2011) found that only 2% of surveyed *BIXI* (the BSP in Montreal, Canada) replace trips previously made by car. In cities in which overall car use is higher, the

proportion of bikeshare users replacing a car trip is higher. For instance, in Melbourne, Brisbane and Minneapolis/St. Paul around one fifth of bikeshare journeys replace a car trip (Fishman et al., 2014).

A number of researchers have examined the factors influencing bikeshare use. Bachand-Marleau et al. (2012) found convenience and the desire to avoid the theft of a private bike to be the key facilitators for *BIXI* use, something found by an earlier study of the same BSP (Fuller et al., 2011). Indeed *convenience* has emerged as one of the most important, overarching motivations for those using bikeshare. In one of the largest studies of its type, Shaheen et al. (2012) conducted an online survey with bikeshare members and operators of various programs in North America, with convenience emerging as the main motivating factor and this too was the finding of a separate study of the Washington, DC. BSP known as *Capital Bikeshare* (LDA Consulting, 2012). The convenience theme is not restricted to North America. Research undertaken by Transport for London (2011) on the *Barclays Cycle Hire* program showed its ability to enhance mobility is a key motivation for use. As shown in Section 2.1, Australian bikeshare users have also identified factors related to convenience as a major motivator for using bikeshare. The spatial configuration of docking stations is seen as a critical factor influencing bikeshare usage (Fuller et al., 2011). Geographic Information Systems (GIS) are beginning to be used as a method for determining docking station location, based on such factors as employment and residential densities (Garcia-Palomares et al., 2012).

2.1. Existing research on Australian bikeshare programs

Limited research exists within the peer-reviewed literature regarding the motivating factors that lead to bikeshare membership, and of the research that does exist, very few have focused on the Australian programs. Understanding what factors motivate people to join BSPs may be useful in future efforts to increase bike-share usage, as it will yield an estimated relationship between the likelihood of joining the program as a function of key program features. The majority of research investigating bikeshare in Australia appears in the non peer-reviewed literature, most often in consultant and operator reports, some of which have been provided to the authors under an *Information Sharing Agreement* signed with each of the Australian bikeshare operators and associated government partner.

The operators of the MBS program conducted a market research exercise approximately six months after the program launched. The research was motivated in part by lower than expected usage and to assist in determining the impact of recent initiatives such as helmet vending machines (mandatory helmet legislation exists in Australia) (Alta Bike Share, 2011). The survey was completed

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