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Examining usage patterns of a bike-sharing scheme in a medium sized city

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ABSTRACT

Bike-sharing is one of the fastest growing new modes of transport in the world, with more and more schemes opening every year. This paper examines the trends in a bike-sharing scheme that has been in operation in Cork since 2014. While many studies exist on how bike-sharing schemes are changing mobility in cities across the globe, few studies have looked at the dynamics of these schemes in smaller cities. One of the motivations in looking at a small city like Cork is to determine if smaller cites derive benefits from bike-sharing schemes and can bike-sharing schemes provide a prominent role in these cities. This research found that in a small, compact city like Cork, average trip times recorded are short with regular uses displaying habitual trip patterns. This includes using the same bike stations and following similar routes on a daily or weekly basis. The findings also suggest weather has an impact upon usage, with longer trips more likely during better weather conditions. The findings of the paper provide insights to the dynamics of usage of a smaller bike-sharing scheme and results on how bike-sharing is offering citizens a new transport alternative.

1. Introduction

Cork Bikes opened in December 2014 with 31 stations and 330 bikes across Cork city. The scheme covers the city servicing all the main trip attractors in the city center including bus and rail stations and University College Cork (UCC) (See Fig. 1). Cork is the second largest city in the Republic of Ireland and had a population of approximately 120,000 in 2011 (CSO, 2011). Table 1 details the modal split of trips to work or university in Cork City in 2011. This data is taken from the 2011 census of Ireland. The results show that in Cork City that driving to work alone has the largest modal share (45%) followed by walking (27%). Cycling has a smaller modal share (3%) however cycling in the city, as with the rest of Ireland, is increasing (Caulfield, 2014). The introduction of the bike scheme in Cork is seen as a policy intervention to increase cycling in the city (National Transport Authority, 2016).

Bike sharing schemes have grown in popularity across the globe in recent years. Much research has been conducted on bike schemes in larger cities but little has been conducted on schemes in smaller cities like Cork. Table 2 details 48 bike-sharing schemes globally with 400 or less bicycles in their current schemes (Bikesharingworld, 2016). The majority of bike-sharing schemes of a similar size to Cork also have a similar population. Given the number of schemes globally of a similar size, it is important to examine how these schemes work and how users interact with these schemes.

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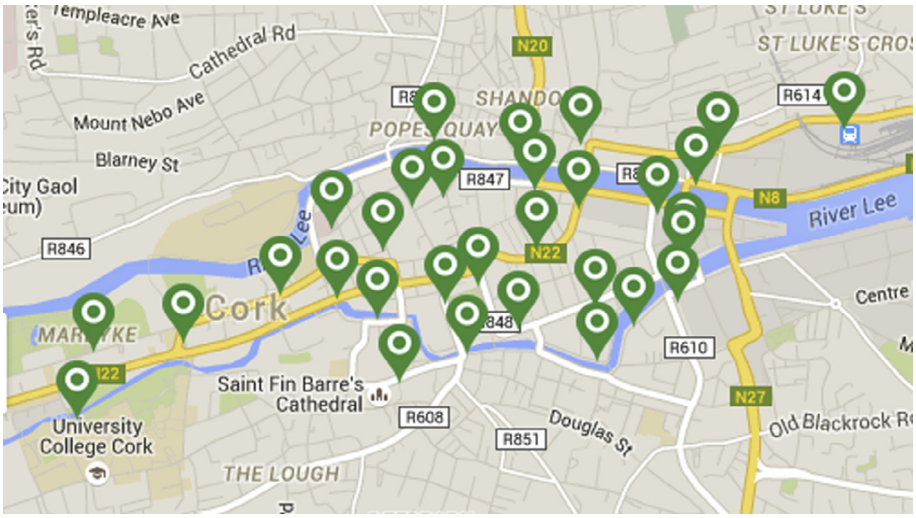

Fig. 1. Map of the Cork Bikes scheme.. Source: Cork Bikes (2016)

Table 1
Mode share in Cork City (those employed and attending University).

Mode	N	%	Average travel time (minutes)	Standard Deviation of travel time
Walking	13,645	27	17	11.12
Cycling	1701	3	16	9.65
Bus	4601	9	30	17.55
Rail	182	0	47	32.41
Motor cycle	296	1	17	12.33
Driver – alone	22,330	45	20	14.29
Drive – passenger	3128	6	18	11.72
Van	1458	3	24	18.53
Other means	130	0	28	24.61
Work from home	731	1	–	–
Not stated	1790	4	–	–
Total	49,992	100	–	–

The research objective of this paper is to examine the trends of usage of a bike-sharing scheme in a small city. The research seeks to determine if in a small city bike-sharing can play a valuable role. Specifically the research looks at how several factors such as weather conditions, routes, distance travelled and frequency of usage impact upon trip time on the bike-sharing scheme. The research adds to the body of rapidly growing work in this field as it considers the usage of a bike-sharing scheme in a small city.

2. Literature review

Numerous concerns regarding the growth of the road transportation sector and climate change have led to the developed interest in sustainable transportation alternatives, and bike-sharing (i.e. the shared use of a bicycle fleet which is accessible to the public and serves as a form of public transportation (Parkes et al., 2013)) is emerging as a prominent strategy to assist in addressing concerns such as the usage of clean fuels, transportation demand management, and land use and transportation connection (Shaheen et al., 2010). As of June 2014, public bike-sharing programmes were incorporated into 712 cities across five continents, comprising approximately 806,200 bicycles at 37,500 stations (Shaheen et al., 2014). Bike-sharing schemes have evolved over the years, initially consisting of free-to-use bike systems and followed by coin-deposit systems, and the majority of today's bike-sharing schemes are IT-based systems, with some cities incorporating additional functionalities such as demand-responsive and multi-modal systems with real-time information (Shaheen et al., 2010).

Bikes-haring schemes are associated with environmental benefits through the diminished usage of motor vehicles and the associated reduction in fuel use and traffic congestion. In addition to these environmental benefits there have also been numerous social benefits reported through the usage of bikes-haring schemes. The American Public Health Association found that the implementation of a public bicycle share programme can lead to greater likelihood of cycling amongst persons living in areas where bike-sharing schemes are available (Fuller et al., 2013). A survey conducted on users of the bike-sharing programme in Washington, D.C. found that 31.5% of respondents reported reduced stress and approximately 30% of individuals