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

Abstract
Bike-sharing is one of the fastest growing new modes of transport in the world, with more and more schemes coming online 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 and the dynamics of these schemes in smaller cities. The findings of this research show that in a small compact city like Cork the average trip times recorded are short and regular users have habitual trip patterns using the same bike stations and following similar routes on a daily or weekly basis. The findings also suggest that weather does have 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 310 bikes across Cork city. The scheme covers the city covering all of the main trip attractors in the city center including the main train station, the bus station and University College Cork (UCC) (See Figure 1). Cork is the second largest city in the Republic of Ireland and had a population of approx. 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 in Cork (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.

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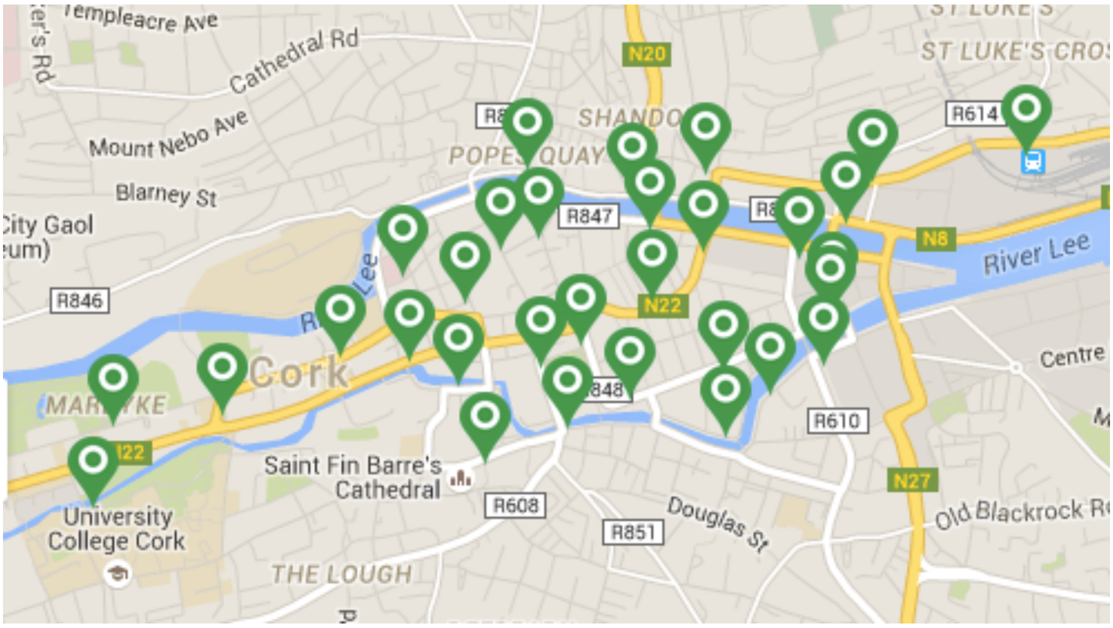

Figure 1: Map of the Cork Bikes scheme

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	1,701	3	16	9.65
Bus	4,601	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	3,128	6	18	11.72
Van	1,458	3	24	18.53
Other means	130	0	28	24.61
Work from home	731	1	-	-
Not stated	1,790	4	-	-
Total	**49,992**	**100**	-	-

Bike sharing schemes have grown in popularity across the globe in recent years. Much research has been conducted on the bike schemes in larger cities but little has been conducted on schemes in smaller cities like Cork. Table 2 details 48 bike-sharing scheme globally with 400 or less bicycles in their current schemes (Bikesharingworld, 2016). The majority of schemes with 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.

Table 2: International bike-sharing schemes

City	**Population**	**Country**	**Year opened**	**Stations**	**Bicycles**
Amiens	133,448	France	2008	26	250
Århus	319,680	Denmark	2007	57	400
Austin, Texas	912,791	USA	2013	46	375
Avignon	91,283	France	2009	17	200
Batumi	125,800	Georgia	2013	22	200

Belfast	333,871	UK	2015	30	300
Belfort	50,128	France	2013	21	200
Belo Horizonte	1.4m	Brazil	2014	40	400
Berlin	3.5m	Germany	2009	50	300
Besançon	116,914	France	2007	30	200
Blackpool	142,065	UK	2009	60	400
Bucharest	1.9m	Romania	2008	6	400
Caen	108,954	France	2008	40	350
Calais	72,589	France	2010	37	160
Cergy-Pontoise	203,913	France	2009	42	320
Charlotte, North Carolina	792,862	USA	2012	21	200
Chattanooga, Tennessee	173,366	USA	2012	33	300
Clermont-Ferrand	141,569	France	2013	22	220
Columbus, Ohio	822,553	USA	2013	30	300
Copenhagen	591,481	Denmark	2013	17	250
Cork	119,230	Ireland	2014	31	330
Dijon	151,212	France	2008	39	400
Frankfurt am Main	717,624	Germany	2009	30	300
Galway	75,530	Ireland	2014	15	195
Girona	97,227	Spain	2009	10	260
Győr	128,380	Hungary	2015	23	180
Indianapolis, Indiana	852,866	USA	2014	25	300
Kansas City, Missouri	467,007	USA	2012	30	300
Kraków	759,131	Poland	2008	34	230
La Rochelle	80,014	France	2010*	63	300
Lausanne	133,897	Switzerland	2013*	23	251
Ljubljana	277,554	Slovenia	2011	33	215
Limerick	95,854	Ireland	2014	23	215
Luzern	78,786	Switzerland	2008	30	280
Madison, Wisconsin	243,344	USA	2011	39	350
Málaga, Andalucía	566,913	Spain	2013	20	400
Mulhouse	111,156	France	2007	40	240
Namur	110,558	Belgium	2012	24	200
Nancy	105,421	France	2009	29	250
Nyon, Gland	29,593	Switzerland	2011	13	167
Opole	122,120	Poland	2012	16	164
Orléans	114,167	France	2007	33	300
Palma	399,093	Spain	2011	28	336
Perpignan	117,419	France	2008	15	150
Stuttgart	604,297	Germany	2007	64	400
Tampa, Florida	347,645	USA	2014	30	300
Valence, Drôme	62,481	France	2010	20	380
Yokohama	3.6m	Japan	2011	15	300

The research objective of this paper is to examine the trends of usage of a bike-sharing scheme in a small city. 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 medium sized 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 bikesharing (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).

Bikesharing schemes are associated with environmental benefits through the diminished usage of motor vehicles and the associated reduction in fuel use and traffic congestion (Pucher and Buehler, 2005), and in addition to these environmental benefits there have also been numerous social benefits reported through the usage of bikesharing 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 stated they had lost weight due to the bike-share system (Alberts, et al., 2012). Bike-sharing has also been associated with an increase in mobility and correlations have been discovered between the close coupling of bike-sharing and transit stops with higher usage rates (Nair, et al., 2012).

There are currently four cities in Ireland equipped with bike-sharing facilities, located in Dublin, Cork, Limerick, and Galway cities. There are currently over 100 bike stations in Dublin (with a minimum of 15 stands at each station) and over 1,500 bicycles (dublinbikes, 2016), whilst in Cork there are 31 stations and 330 bicycles (Coca-Cola Zero, 2016). Coca-Cola Zero has entered into partnership with the bike-sharing schemes in Ireland, with branding applied to each individual bike in return for investment in the schemes (dublinbikes, 2014). The bike-sharing systems operate on a subscription basis with options available for an annual pass or a three-day pass, and tiered pricing is incorporated based on the duration of a journey made by each bike user, with the first thirty minutes of each journey being free. The Dublinbike scheme is considered one of the most successful bike-sharing schemes in the world (Daly, 2011), with the volume of long-term subscribers surpassing 58,000 by December 2015 and over 3.7 million trips made in 2015 (dublinbikes, 2015).

Due to the potential achievable benefits through the incorporation of bike-sharing schemes in cities there is a growing volume of research into bike-sharing systems. One study focused on understanding the diffusion of public bike-sharing systems in Europe and North America using quantitative and qualitative analyses to explore the reasons for adoption decisions in different cities; it was found that both Europe and North America are experiencing a major adoption phase with new systems emerging and growth in existing systems, and that private sector operators have been important entrepreneurs in both locations with respect to technology and business models (Parkes, et al., 2013). A further study concentrated on the impacts and processes of the implementation and operation of bike-sharing systems and specifically whether they are achieving their core objectives; this study found benefits in terms of improved health, increased transport choice and convenience, reduced travel times and costs, and improved travel experience, but concluded that these benefits are unequally distributed since typical users are young males in more advantaged socio-economic positions. Furthermore, the study states that there is no direct evidence that bike-sharing significantly reduces traffic congestion, carbon emissions, or pollution (Ricci, 2015).

The role of bicycle sharing in an Irish context was studied through a survey analysis, where it was discovered that the bike-sharing scheme in Dublin City: is used predominantly by higher-income individuals; has a different functionality during the peak and off-peak travel times; and has been indirectly successful at improving driver awareness towards cyclists (Murphy and Usher. 2015). A further study focusing on Dublinbikes sought to explain the "ripple effects" associated with the incorporation of a bike-sharing scheme in a city. The study examined a number of domains including rules and regulations, user experiences of navigating the city, the emergence of new factors, the development of infrastructures, and traffic management measures. It was found that the introduction of the Dublin bike-sharing scheme set in motion an array of unpredicted processes and cascade effects, including the generation of new experiences of the city, a greatly increased usage of bicycles in some key areas, economic growth, and shifts in dominant transportation activities (Ó Tuama, 2015).

In a global context, one study focused on mining data from 38 bikesharing systems using an extensive database of the geographical location and bicycle occupancy of each docking station, and analysis was conducted on the variation of occupancy rates over time in order to infer the likely demographics and intentions of user groups. The purpose of the study was to inform operators and policymakers on maintenance, suitable locations for future infrastructure installations, and better targeting of promotional materials to encourage new users (O'Brien, et al., 2014). Data mining was also used in order to analyse operational data from bike-sharing systems to derive bike activity patterns at bike-sharing stations (Vogel, et al. 2011). A further study was concentrated on utilising global bike-sharing data to analyse road safety, where it was discovered that the introduction of a bike-share system is associated with a reduction in cycling injury risk and bike-share users are less likely than other cyclists to sustain fatal or severe injuries (Fishman and Schepers, 2016).

Much of the research conducted to date on bike-sharing schemes tends to take one or more of three general approaches. The approaches typically are:

1. Surveying users of the scheme
2. Data mining of data from online sources of usage at stations
3. Obtaining data from the bike-sharing operator.

Table 2 lists several studies that have examined various aspects of bike-sharing schemes. This list is not meant to be exhaustive; its purpose is to demonstrate the various means of examining bike-sharing as listed above. Table 2 shows that the literature relies on a number different methods of analysis to provide insights into how bike-sharing schemes operate.

Table 2: List of studies

Study	City	Scheme size (No. Bikes)	Analysis type
O'Neill and Caulfield (2012)	Dublin	550	Survey and data mining
Fishman et al (2015)	Melbourne and Brisbane	600 (Melbourne) 2,000 (Brisbane)	Survey
O'Brien et al (2014)	Multiple cities	NA	Data mining
O'Tuma (2015)	Dublin	550	Interviews (survey)
De Chardon and Caruso (2015)	Multiple cities	NA	Data mining
Zhao et al (2014)	Multiple cities	NA	Data mining
Daito and Chen (2013)	Washington D.C.	2,800	Full data analysis
Tang et al (2011)	Multiple cities	NA	Survey
Wang et al (2013	Minneapolis	1,550	Data mining
Hampshire and Marla (2012)	Barcelona and Seville	6,000 (Barcelona) 2,100 (Seville)	Data mining
Zhao et al (2015)	Nanjing	1,100	Full data analysis
Beecham and Wood (2014)	London	11,500	Full data analysis
Gebhart and Noland (2014)	Washington D.C.	2,800	Full data analysis
Faghih-Imani and Eluru (2015)	Chicago	3,000	Full data analysis
Corcoran et al (2014)	Brisbane	2,000	Full data analysis
Kaplan et al (2015)	Copenhagen	1,860	Survey

2. Overview of the usage of the bike-sharing scheme

This section of the paper provides an overview of the usage of the scheme during the evaluation period. In this section the data used is detailed, as are some of the usage trends related to the data.

2.1 Data

The National Transport Authority (NTA) of Ireland provided the data used in this study. The data is from 2015 and represents the first full year of operation of the Cork Bikes Scheme. The original dataset contained approx. 290,000 trip records. Prior to the evaluation some cleaning of the data was conducted. The first set of data to be removed related to those on temporary passes using the scheme. These were removed as they were considered to be visitors to the city and would not reflect the patterns of native users. This resulted in removing less than 2,000 trip records. The second set of data removed were those trips of less than one minute. These were removed as they were assumed to be trips in which the bike wasn't removed from the station and was just put back once the bike was take out. This resulted in just over 20,000 records being removed from the dataset. The data provided for this research was anonymised so therefore no information on the age or gender of the users was provided. The authors realise this is a limitation of the research, however the findings presented in the subsequent sections do provide several interesting findings on the operation of the bike-sharing scheme.

2.2 Examining trends in the usage data

The first set of results presented in this section detail the variables used in subsequent modelling sections and the explanations of these variables are also contained in Table 3. These variables also provide some insight into the usage patterns of the scheme. Travel time is the first variable examined. The results show that the majority of the trips conducted in the scheme are short trips with over 70% of trips less than 9 minutes. Figure 2 shows the distribution of travel time again showing the amount of short trips that take place in the scheme. As individual identifiers such as age and gender were not available for this study, it was deemed important to find a variable that would show how often people used the scheme. A frequency of usage variable was created to demonstrate how often people used the scheme. The results show that about 18% of people use the scheme on a daily basis, and almost 60% of users use the scheme once or twice a week. One of the aspects of the scheme that is examined is how busy the stations are. The busiest stations are categorised as having over 50 trips per-day and the stations with the lowest demand have less than 20 trips per day. The results in Table 3 show that approx. 60% of all trips originate from the busiest stations in the scheme. The other variables examined that relate to the usage of stations was did the trips from the bike stations have the same origin and destination, the results showed that only 4% of all trips fell into this category. Another variable examined was the frequency of origin and destination pairs (or routes) within the network. The origin and destination pairs were deemed to be the most popular if over 1,000 trips on these routes were recorded and least popular if less than 500 trips occurred. The results showed that the majority of trips recorded on the least popular routes.

The final set of results examines weather and time of day variables. The results show that over 82% of trips were recorded on a weekday. The results for time of day show that majority of trips occur in the off peak period from 10am – 4pm and in the evening peak between 4pm – 6pm. Figure 3 details a breakdown of the number of trips taken across the day. A morning and evening peak is apparent as well as a steady usage during the afternoon off-peak period. The rain variable was estimated by taking the average rain fall in Cork over 2015 and estimating did the trips take place in a day above or below this average rain fall of 2.7mm of rain. The findings show, as one might expect, more trips took place on days where the rainfall was below average. The other weather variables (temperature and hours of sunshine) were segmented by quartiles so there is more or less an even split between these quartiles. Further interpretation of the impacts of these weather conditions on trips is conducted in section 3.2. The final variable examined is the distance travelled by users of the scheme. This distance is the distance estimated as the distance between bike stations and it is not a distance that is measured by monitoring or tracking cyclists in the network. Therefore the distance may not be accurate but it does give a good indication of distance travelled. The results for distances show that the majority of trips are short trips. This finding corresponds to the travel times recorded.

Table 3: Description of variables used in the MNL model

		N	%
Travel Time	Less than 4 mins	58,417	22.3
	4 - 6 mins	65,300	25.0
	6 - 9 mins	68,494	26.2
	Over 9 mins	69,167	26.5
Frequency of usage	Every day	47,129	18.0
	At least twice a week	110,547	42.3

	At least once a week	48,746	18.6
	Less than once a week	54,956	21.0
Usage of the bike station	Busiest Stations (over 50 trips per day)	80,755	30.9
	Busy Stations (49-30 trips per day)	73,624	28.2
	Less busy stations (29-20 trips per day)	52,679	20.2
	Least busy stations (less than 20 trips per day)	54,320	20.8
Trip OD	Same origin and destination	10,509	4.0
	Different origin and destination	250,869	96.0
Frequency of origin and destination pair	Over 1,000 trips	42,410	16.2
	999 - 500 trips	67,823	25.9
	Less than 500 trips	151,145	57.8
Day of the week	Weekday	215,895	82.6
	Weekend	45,483	17.4
Time of day	AM Peak	46,557	17.8
	Off Peak - Afternoon	92,982	35.6
	PM Peak	84,144	32.2
	Off Peak - Night	37,695	14.4
Rainfall	Below 2.7mm	186,298	71.3
	Above 2.8 mm	75,080	28.7
Minimum average temperature	Below 5.3 degs	64,802	24.8
	5.4 - 8 degs	62,702	24.0
	8 - 9.9 degs	66,891	25.6
	Above 9.9 degs	66,983	25.6
Hours of sunshine	Less than 0.7 hrs	68,178	26.1
	0.71 - 3.3 hrs	61,055	23.4
	3.4 - 7.4 hrs	66,491	25.4
	More than 7.4 hrs	65,654	25.1
Distance travelled	Less than 852m	59,356	22.7
	852 - 1288m	64,653	24.7
	1289 - 1848m	67,366	25.8
	Greater than 1849m	70,003	26.8

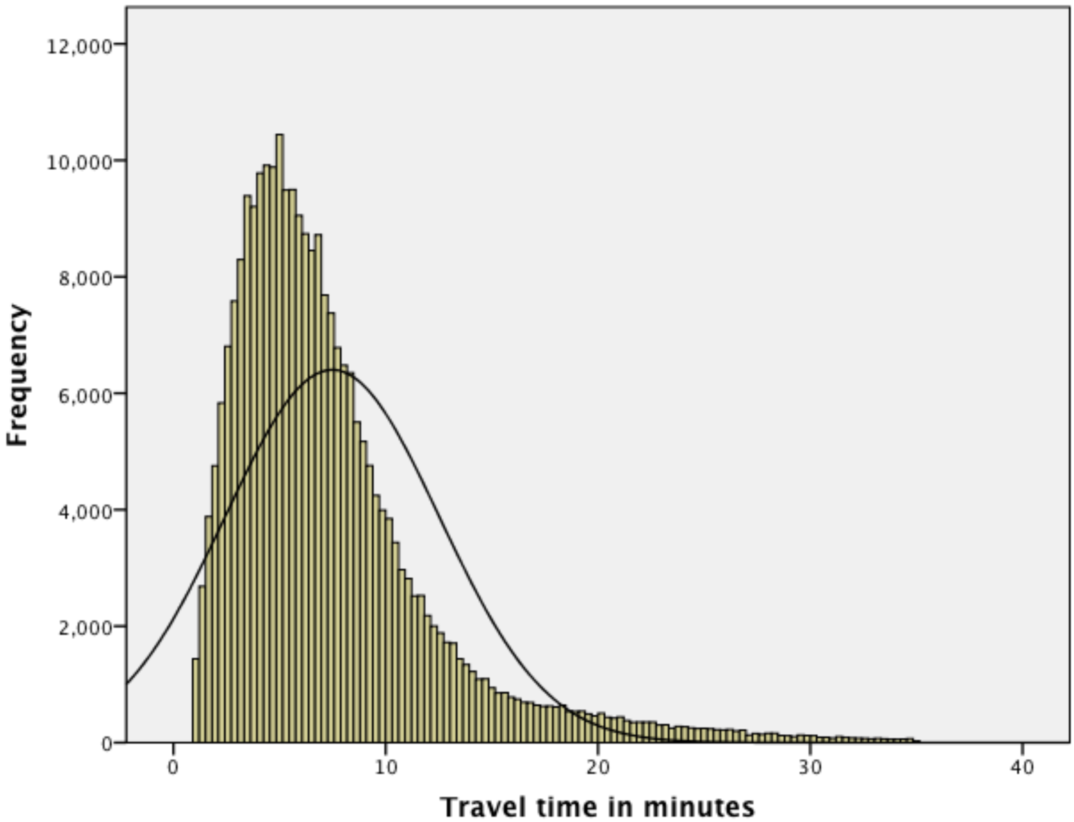

Figure 2: Distribution of travel time

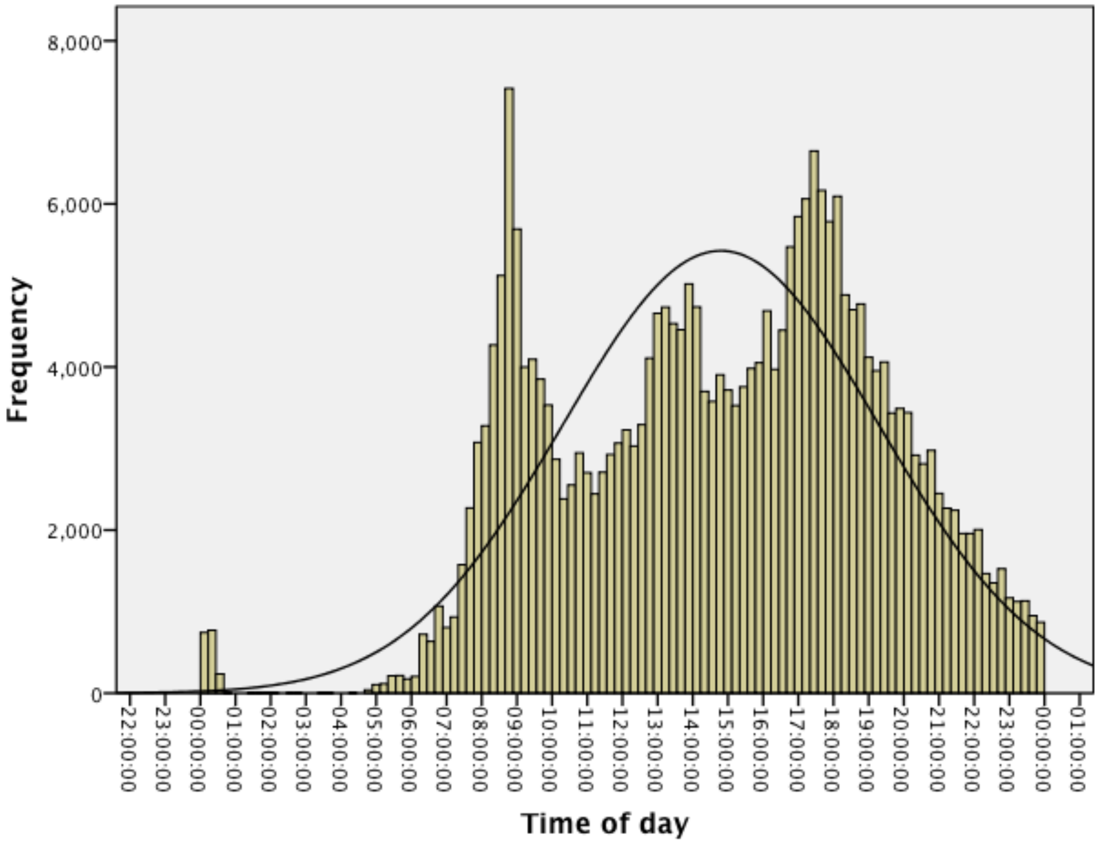

Figure 3: Distribution of rental times

This section of the paper examines some of the usage trends in the data. Table 4 details some of the travel time statistics. The results for the day of the week show an average trip time of 9-10 minutes, this increases to 12-13 minutes at the weekend. The standard deviation and standard error values for the weekend also increase demonstrating a greater degree of variation in travel times at the weekend. The second set of results examines how the frequency of usage impacts upon travel time. The result show that those that use the scheme most have the lowest average travel times and a lower standard deviation and standard error of travel time, compared to those that use the scheme less frequently. The results for the time of day travelled shows that the shortest travel times were recorded in the AM Peak followed by the off-peak nighttime. The final set of results in Table 4 report the travel time for the most popular OD pairs in the network. The findings show that the most popular OD pairs have the lowest average travel time and standard deviation and standard error of travel time.

Table 4: Examination of Travel time

Trips by day of the week	Average travel time	Standard deviation	Standard Error
Monday	9 minutes	20.9	.10
Tuesday	9 minutes	23.6	.10
Wednesday	9 minutes	18.9	.08
Thursday	10 minutes	24.5	.11
Friday	9 minutes	22.8	.10
Saturday	12 minutes	46.4	.28
Sunday	13 minutes	30.8	.21
User type			
Everyday	8 minutes	18.6	.08
At least twice a week	9 minutes	20.8	.06
At least once a week	10 minutes	26.7	.11
Less than once a week	13 minutes	38.5	.13
Time of Day			
AM Peak	8 minutes	17.5	.07
Off Peak - Afternoon	11 minutes	30.0	.09
PM Peak	10 minutes	22.4	.07
Off Peak - Night	9 minutes	32.6	.16
Frequency of OD pair			
Over 1,000 trips	8 minutes	10.8	.05
999 - 500 trips	10 minutes	24.7	.09
Less than 500 trips	11 minutes	30.4	.08

3. Results, methods and analysis

3.1 Modelling approach

A logistic regression model was used to examine trends within the dataset. The modelling approach uses travel time as segmented into four categories in Table X as the dependent variable against several independent variables also outlined in Table X. The model takes the following functional form:

$$\text{logit(p)} = \log\frac{p}{1-p} = a + \beta T + \delta BS + e$$

where p is the probability that the event occurs, in this case it is that the trip travel time falls into one of the quartiles examined, βT is the set of trip characteristics (distance travelled, weather conditions, time of the day, day of the week and frequency of shared bike usage), δBS is the set of bike station characteristics (usage of the bike station, trip OD and frequency of origin and destination pair) and e is a random error term.

3.2 Results of the logistic regression model

The results of the logistic regression model are presented in Table 4. The model examines the factors that impact upon trip duration. The Nagelkerke R^2 of 0.452 indicates a good model fit. The model provides several interesting insights into the usage of the bike sharing scheme in a small city. The first set of results shows that the most frequent users of the scheme are likely to have the shortest journeys. This perhaps suggests that those that use the scheme the most frequently do so for habitual short journeys. Trips from the busiest stations in the scheme were also found to be the shortest trips, this supports the thesis that trips in this scheme are habitual and short. The second set of results that relate to the bike station show that the shortest trips (less than 4 minutes) were likely to be round trips from the same bike station, with longer duration trips likely to have a different origin and destination (as one would expect). The results for frequency of O-D pair (or popularity of a route) shows that the most popular routes have the shortest travel times, this again supports the idea of frequent habitual routes.

The findings also show that shorter trips are likely to take place on weekdays. As one might expect, the results of the rainfall variable show that when rainfall is above average that shorter journeys are more likely. The results for both temperatures an hours of sunshine show that shorter trips are more likely on warmer and brighter days. The final two variables estimated examine how distance and time of day impact upon the travel time. The distance travelled variable, as one would expect, shows that those travelling shorter distances were likely to have the shortest travel times. The final set of variables examined in Table 4 that measure the impact of time of day travelled on trip duration. The findings show that in the morning peak period the shortest trip times were recorded.

The results presented in Table 4 provide a number of interesting findings on travel time on the Cork Bikes scheme. When considering the variables linked to the usage of the stations, the popularity of OD pairs and the frequency of individual usage, the results seem to suggest that the system has a set of regular users that have habitual trips that they take on a daily or at least weekly basis in the network. Further research is needed to determine if these trips are new trips or are these trips as a result of modal shift.

Table 4: Logistic regression model results

		Less than 4 minutes	4 – 6 minutes	6 – 9 minutes
	Intercept	-4.403**	-2.316**	-.829**
Frequency of usage	Every day	1.304**	.803**	.378**
	At least twice a week	.771**	.491**	.302**
	At least once a week	.303**	.181**	.186**
	Less than once a week	0^b	0^b	0^b
Usage of the bike station	Busiest Stations (over 50 trips per day)	.448**	.251**	-.041*
	Busy Stations (49-30 trips per day)	.276**	.205**	.073**
	Less busy stations (29-20 trips per day)	.014**	.103**	-.016**
	Least busy stations (less than 20 trips per day)	0^b	0^b	0^b
Trip OD	Same OD	.093**	-1.420**	-1.678*

	Different OD	0^b	0^b	0^b
Frequency of OD pair	Over 1,000 trips	.235**	-.061*	.119**
	999 - 500 trips	.085**	.033*	.091*
	Less than 500 trips	0^b	0^b	0^b
Day of the week	Weekday	.290**	.246**	.179**
	Weekend	0^b	0^b	0^b
Rainfall	Below 2.7mm	-.148**	-.135**	-.107**
	Above 2.8 mm	0^b	0^b	0^b
Minimum average temperature (degrees	Below 5.3 degs	-.013**	-.014**	-.021**
	5.4 - 8 degs	.094**	.046**	.026*
	8 - 9.9 degs	.109**	.093**	.087**
	Above 9.9 degs	0^b	0^b	0^b
Hours of sunshine (in hours)	Less than 0.7 hrs	.102**	.148**	.099*
	0.71 - 3.3 hrs	.104**	.095**	.067**
	3.4 - 7.4 hrs	.229**	.330**	.234*
	More than 7.4 hrs	0^b	0^b	0^b
Distance travelled (meters)	Less than 852m	5.363**	2.341**	-.030**
	852 - 1288m	4.596**	3.239**	1.029**
	1289 - 1848m	2.224**	2.074**	1.251**
	Greater than 1849m	0^b	0^b	0^b
Time of day	AM Peak	.584**	.379**	.262**
	Off Peak - Afternoon	-.608**	-.379**	-.190**
	PM Peak	-.576**	-.354**	-.135**
	Off Peak - Night	0^b	0^b	0^b
N				261,378
-2Log-likelihood at convergence				14344.080
Nagelkerke R^2				.452
Chi-squared statistic				11359.358
Degrees of freedom				69

Conclusions

As discussed in this paper bike-sharing is growing rapidly around the world. Bike-sharing, is one of the fastest growing modes of shared mobility globally, and is changing attitudes to cycling and sharing transport infrastructure. This paper provides details of one of the most recently launched bike-sharing schemes in Ireland. The results show that even though Cork would not have been a city with a strong cycling culture, that the scheme is being used frequently.

One of the key things this paper considered was usage patterns within the bike-sharing scheme. The findings show that the majority of trips in the scheme were short and in most cases frequent trips. Frequent users of the scheme were shown to have the shortest travel times, suggesting that these users have incorporated the scheme in to their daily (or weekly) trips. Weather conditions were also found to have an impact upon usage of the scheme. During good weather conditions the number of trips and the travel time was shown to be greater.

The findings of this paper do provide valuable insights as to how a bike-sharing scheme works in a small city. More research is needed on these smaller schemes to understand how the dynamics of the schemes differ from those schemes in larger cities like New York and London. The findings also inform discussion on schemes in even smaller cities, given that the results found in Cork show very small trip times, would this mean that in even smaller cities trip times would be smaller.

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