



CHICAGO DOCKLESS BIKESHARE PILOT PROGRAM

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Acknowledgments

PROJECT TEAM

Office of the Mayor

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PROJECT SUPPORT

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Table of Contents

INTRODUCTION	4
THE PILOT	5
CONTEXT FOR BIKESHARING IN CHICAGO	6
PILOT AREA DEMOGRAPHICS	7
BIKE AVAILABILITY	9
TRIP DATA	10
CUSTOMER REPORTS	15
SURVEY RESULTS	17
SURVEY RESULTS	18
CONCLUSION	19
APPENDIX	20



INTRODUCTION

Over the last five years, Chicago has embraced bikeshare as a new transportation service that provides residents with a healthy, sustainable, and convenient way to get around the City. Since the launch of Divvy in 2013, technological innovations have led to the proliferation of new bikeshare service models. Most notably, dockless bikeshare has generated widespread interest from urban residents, city governments, and private investors as it has spread around the U.S. over the last several years. Whereas users of traditional bikeshare systems, like Divvy, check out and return bikes to fixed docking stations, dockless bikeshare users begin and end their rides without the need for a docking station and most commonly register and pay for rides via a smart phone app.

In 2017 and 2018, new app-based, dockless bikesharing technologies launched in a number of cities across the US. These privately owned and operated systems offer cities myriad potential benefits and challenges as they operate across diverse scales, density, technology, equipment, and operations. Peer cities have adopted a variety of approaches to regulating the operations of private dockless bikeshare systems on public rights-of-way. The presence of multiple start-up entities in this new market makes it challenging to rate dockless performance in other cities, as none have operations similar to Chicago's geographic size, varied population density, and existing city-owned dock-based bikeshare system.

To better understand the potential benefit of dockless technology and the flexibility of new operating models, the City of Chicago conducted a pilot to prioritize and address Chicago-specific needs and concerns. The City's core intentions for conducting the dockless bikesharing pilot were to:

- 1. Explore whether app-based dockless bikesharing technology would enhance mobility options for Chicagoans by conducting a thoughtful, short-term pilot in an economically diverse area of the City.**
- 2. Bring bikesharing to South Side communities that have requested bikeshare expansion and require vendors to make bikes available throughout the pilot area.**
- 3. Mitigate the potential for clutter and blockage of the right of way observed in other cities by limiting the number of bikes per vendor and exploring a requirement that the majority of bikes be equipped with lock-to technology.**
- 4. Ensure accessibility for Chicagoans facing digital or financial barriers by requiring each vendor to provide non-digital access and cash-based options (e.g., in-person signup, dial-in or text option to unlock a bike).**

THE PILOT

In order to evaluate the operations of and demand for dockless bikeshare in Chicago, the City conducted a six-month pilot program, from May 1 to November 1, 2018, on the far South Side (see map of pilot area on the following page). The service area for the pilot was chosen to provide access to bikeshare in areas currently not served by Divvy and support the interest of community members, advocacy groups, and aldermen to test dockless bikeshare in their wards.

Private companies that participated in the pilot were required to obtain an Emerging Business Permit and meet minimum requirements related to safety standards, insurance, equity, data sharing, and pilot operations (see full permit requirements here). Companies also had to pay a \$250 permit application fee and a \$50 administrative fee per bike to address costs incurred by the City during the pilot.

Four companies participated in the pilot program: Jump, Lime, Ofo (who left the pilot in early July), and Zagster. In order to address the concern of bikes being knocked over, parked haphazardly and blocking the public right of way, the pilot featured bikes with lock-to technology, so that riders could lock the bikes to a fixed object at the end of their trip with a lock that was integrated into the bike. As a result, 250-700 bikes with lock-to technology and 50 - 100 bikes using wheel-lock technology were deployed throughout the pilot.

Each company that participated in the pilot was required to share data with the City related to bike availability, trip details, violations and user issues, and bike maintenance. Several factors have limited final data for analysis. This includes the varied participation periods from the different vendors throughout the pilot, communications challenges, and some incomplete submissions. The City met regularly with vendors during the pilot to address data issues and clarify expectations for consistency and quality. The pilot's structure would have allowed the City to revoke permits of vendors in non-compliance, however the end result would have been fewer overall bikes in the pilot. This would further limit the data set and, moreover, limit residents' access to bikes. Jump and Zagster, both of which featured bikes with lock-to technology, complied with all of the data requirements. Both companies began providing bike availability data in August.

DATA RECEIVED FROM VENDORS

	JUMP	ZAGSTER	LIME	OFO
Bike availability	Partial	Partial	No	No
Trips	Yes	Yes	Yes	Yes
Violations	Yes	Yes	Yes	Yes
Bike maintenance	Yes	Yes	Partial	Partial

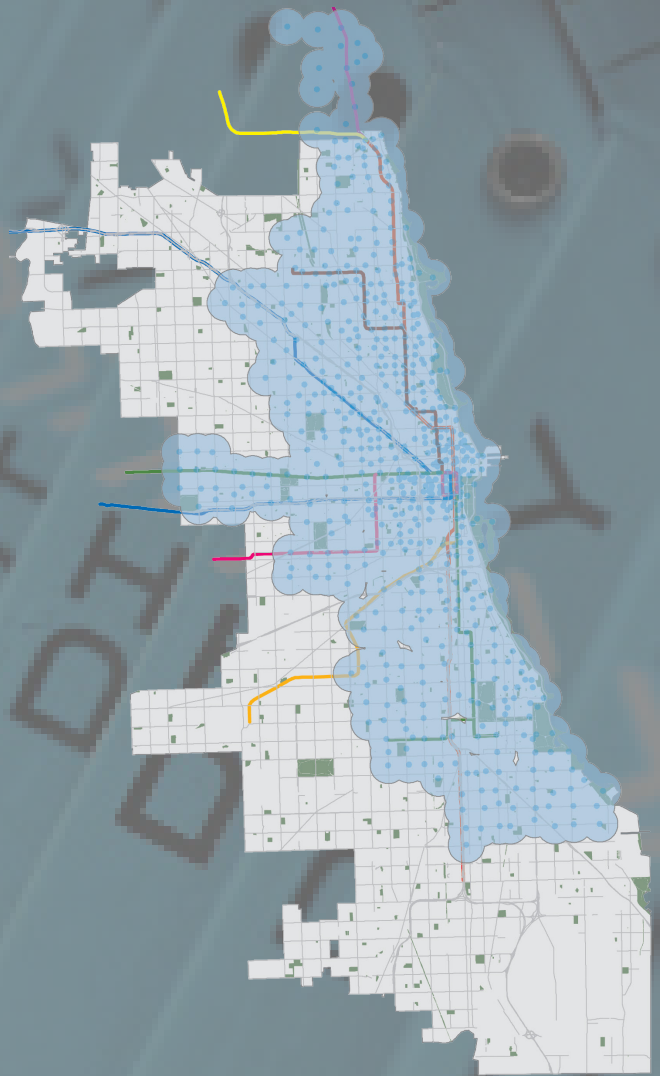


Context for Bikesharing in Chicago

The Divvy bikeshare system launched in 2013 with 3,000 bikes and 300 stations. Divvy serves as an extension of public transit, helping residents complete the first and last mile of their commute and conveniently access neighborhood services without the need for a car. The Divvy system is owned by the City of Chicago, and its development has been supported by over \$30 million in federal funds. Since its launch, Divvy has grown to more than 600 stations, covering 100 square miles and serving nearly two thirds (2/3) of Chicago's population.

As a year-round system with over 37,000 members and more than 18 million trips taken to-date, Divvy has become a popular transportation asset and an integral part of the City's transportation landscape. Bikesharing empowers thousands of people to utilize Chicago's 300+ miles of bikeways. In 2015 CDOT launched the Divvy for Everyone (D4E) program to serve users without debit or credit cards, and a subsidized membership option for those facing financial hardship. D4E was one of the first programs of its kind in the nation. As a publicly owned service, Divvy supports access to healthy, affordable transportation options for those who need it most.

With a new sponsorship opportunity from Lyft in Spring 2019, Divvy will begin to transition from a traditional station-based system to a hybrid system in which users will have the option of locking their bikes in a station or to a fixed object using dockless lock-to technology for ending their trips. While the station-based model has served Chicago well for almost six years, it is reliant on a dense network of stations and robust public funding to purchase new stations and grow the system. Thus far, these factors have limited the rate of expansion into new neighborhoods making the goal of citywide coverage unlikely by 2025. Under the more flexible hybrid model, network density will be easier to achieve and the infusion of sponsorship capital has Divvy on target for citywide coverage by 2021.



Existing Divvy service area

PILOT AREA DEMOGRAPHICS

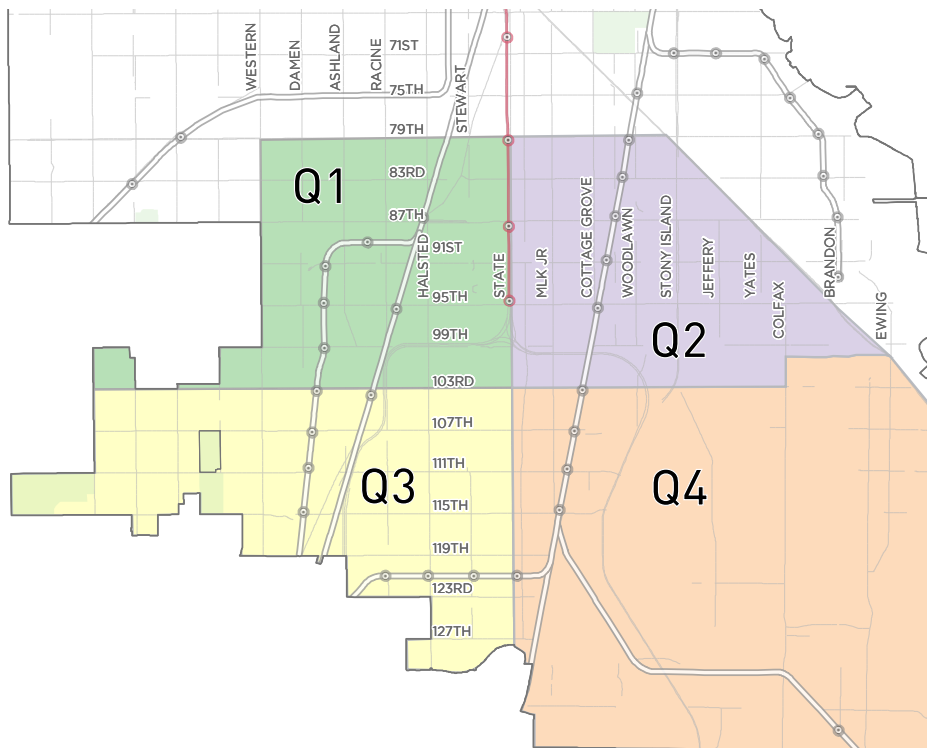
The City selected the area south of 79th Street and west of the Chicago Skyway as the service area for the dockless bike share pilot. The communities within the dockless bikeshare pilot area represent a range of Chicago’s overall demographic and economic dynamics (see table on p. 8). Because of the similarities between the pilot area and the City as a whole, the results of the pilot will provide valuable information on how dockless bikeshare may be used, and how successfully it could operate, in different communities across the City. Residents of the pilot area exhibit similar commuting patterns to the City as a whole and the average economic hardship index score calculated by the Chicago Department of Public Health (CDPH) for community areas within the pilot (52.0) is close to the average for all community areas in Chicago (49.5) (see Appendix for more information).

The pilot area does differ from other areas in Chicago on two particular factors: minority population and population density. The pilot area has a higher proportion of residents of color (77%) than the entire city (52.5%) and a lower population density (6,620 people/square mile vs. 12,608 people/square mile for all of

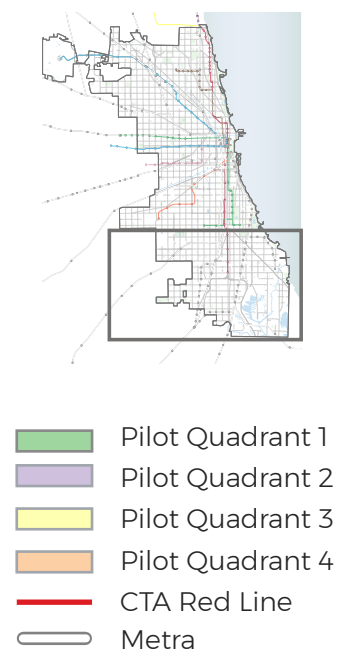
Chicago). Evidence from the Divvy system in Chicago and other bikeshare systems around the United States has demonstrated that there is significant demand for bikeshare in areas with high population density, so Chicago’s dockless bikeshare pilot was designed to provide the City with more information on how this new technology would work in lower density areas. It should also be noted, though, that parts of the pilot area (Quadrants 1 and 3) have population densities that approach the City’s overall average. Likewise, the diversity of income ranges and ethnic and racial diversity within the pilot area will provide the City with valuable information on bike share demand and operations in a geography with different economic and demographic characteristics compared to much of Divvy’s current service area.

One key factor that may have impacted usage of dockless bikes during the pilot is the relative lack of bicycle infrastructure (e.g., bike lanes and trails) within the pilot area. While a portion of the Major Taylor Trail runs through the pilot area, only 10% of the designated bike routes across the City are within the pilot area, even though the pilot area accounts for 23% of the City’s total area .

Dockless Bike Share Pilot Area



Map Key



DEMOGRAPHICS

	CITY OF CHICAGO	PILOT AREA	PILOT AREA QUADRANT 1	PILOT AREA QUADRANT 2	PILOT AREA QUADRANT 3	PILOT AREA QUADRANT 4
AREA (square miles)	230.9	53.4	9.6	9.7	11.7	22.4
POPULATION DENSITY (people/square mile)	12,608	6,620	10,606	8,672	10,739	3,736
MINORITY POPULATION (% of total)	52.5%	77.0%	83.9%	95.4%	66.3%	61.7%
HOUSEHOLDS WITHOUT ACCESS TO A MOTOR VEHICLE (% of total)	24.4%	20.8%	20.3%	25.8%	15.9%	22.6%
COMMUTERS WHO DRIVE ALONE TO WORK (% of all workers)	52.9%	62.7%	60.3%	57.2%	67.8%	62.2%
COMMUTERS WHO WALK, BIKE, OR USE PUBLIC TRANSPORTATION (% of all workers)	34.5%	23.8%	27.7%	29.8%	18.9%	22.6%
HOUSEHOLD INCOME < \$50,000 (% of all households)	51.6%	55.6%	53.5%	61.6%	47.4%	63.8%
HOUSEHOLD INCOME < \$25,000 (% of all households)	28.7%	31.7%	30.6%	34.9%	27.2%	37.6%
ECONOMIC HARDSHIP INDEX (from Chicago Department of Public Health)	49.5	52.0	47.2	55.1	36.7	62.3

BIKE AVAILABILITY

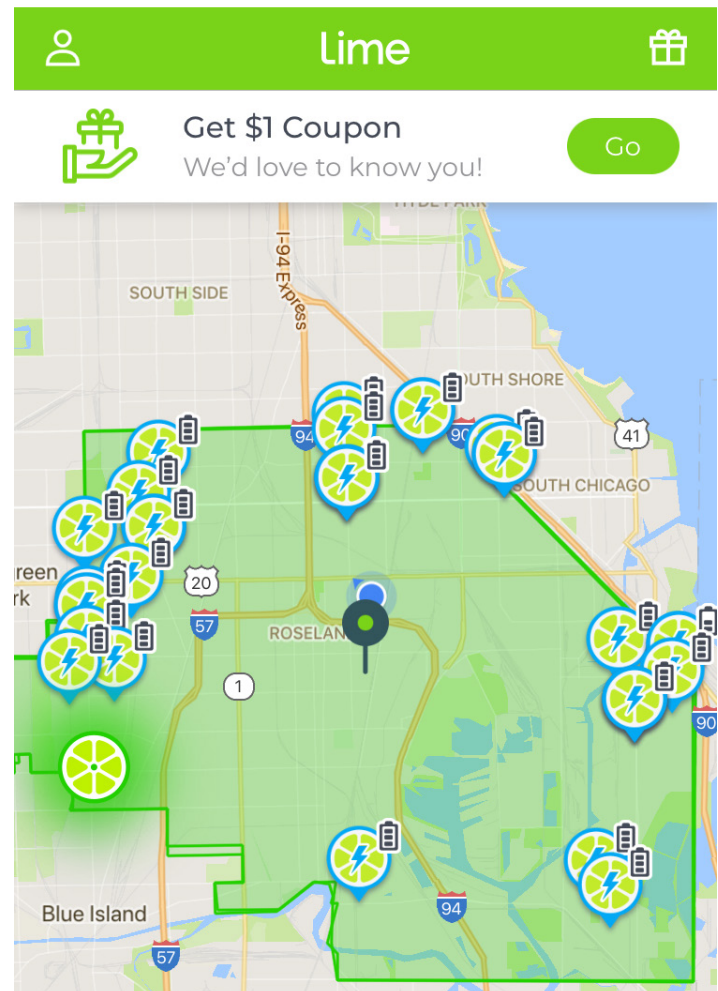
Of the four companies that participated in the pilot program, only Jump and Zagster published data on the availability of their bikes (and only from August 23 through October 26). Both Jump's and Zagster's bike fleets included lock-to technology and were allowed up to 350 bikes.

From the end of August through October, a total daily average of 248 Jump and Zagster bikes were available across the pilot area. During the same time period, the maximum number of bikes available at any one point was 522 on September 21; the lowest number of bikes available was 152 on October 26, as the pilot period was winding down. Bike availability fluctuated depending on the number of bikes that were being used, the number of bikes taken off the street for repairs/maintenance, and private operators' decisions regarding how many bikes to deploy.

For the time period when data on bike availability was published, an average of 0.7 bikes were available for every 1,000 people within the pilot area and an average of 4.6 bikes were available per square mile. Looking at a one-week sample of the availability data (from September 3-7), Quadrant 1 had the highest relative number of bikes available, with an average of 0.82 bikes available for every 1,000 residents and 8.7 bikes available per square mile. For the same time period, Quadrant 4 had the lowest relative number of bikes available, with an average of 0.65 bikes available for every 1,000 residents and 2.4 bikes available per square mile. The National Association of City Transportation Officials (NACTO) has found that bikeshare usage is predominantly driven by convenience and that bikeshare usage grows exponentially when stations are placed in close proximity. The same principles are true for dockless bikeshare, and the relatively low density of dockless bikes across the pilot area and ratio of bikes to residents likely impacted the number of trips and overall usage of dockless bikes during the pilot.

To ensure all of the community areas within the pilot area had access to dockless bikes, vendors were required to maintain at least 15% of their overall fleet within each quadrant of the pilot area. In examining a sample of bike availability data provided by Jump and Zagster, both companies distributed bikes, and bikes were regularly used in all four quadrants of the pilot area, but neither company always met the 15% requirement.

Lime Bike Availability Example



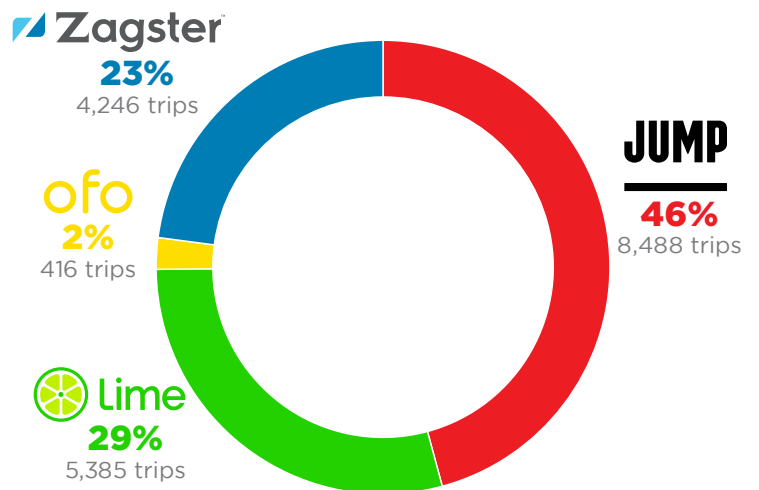
TRIP DATA

During the six-month pilot program, 18,525 trips were taken using the dockless bikes, for an average of 101 trips/day. One common metric for evaluating the efficiency and performance of docked bikeshare systems is the number of trips taken per bike each day, which captures the turnover of bikes and efficiency of the system. During the period when bike availability data was available from Jump and Zagster, the two companies' bikes saw an average of 0.38 trips/bike/day.

While the number of trips/bike/day has been a standard measure of efficiency for dock-based systems, it may be less indicative of success for dockless bikeshare. Trips/bike/day captures the turnover of bikes, which is critical in increasing revenue and profitably, but overall mobility and aggregate usage may be more important indicators for dockless bikeshare's success. During the dockless bikeshare pilot, there were an average of 0.29 trips per 1,000 residents each day. This number varied across the pilot area. Quadrant 1 had the highest rate with 0.33 trips per 1,000 residents per day, while Quadrant 4 had the lowest rate with 0.09 trip per 1,000 residents per day.

Of the four companies that participated in the pilot program, Jump bikes were used for the greatest number of trips. Despite the fact that Jump did not enter the pilot until early July, 8,488 trips were made using Jump bikes which accounted for 46% of all the trips taken during the pilot. Also, despite only having 50 bikes deployed across the pilot area, Lime bikes were used for 5,385 trips (29% of all trips taken during the pilot). Both Jump and Lime offered electric-assist bikes, potentially indicating a user preference for electric-assist bikes.

Total Trips by Company



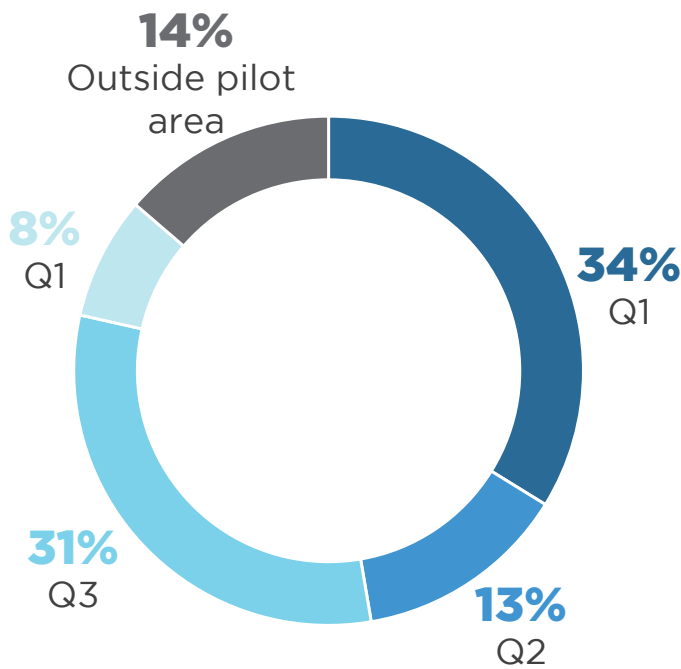
BIKE AVAILABILITY AND REPORTED TRIPS

	MAX # OF BIKES ALLOWED	AVERAGE # OF BIKES AVAILABLE	TOTAL TRIPS	TRIPS BEGINNING IN PILOT AREA QUADRANT			
				1	2	3	4
JUMP	350	137	8,488	2,861	1,778	2,636	614
ZAGSTER	350	111	4,246	1,556	385	964	460
LIME	50	Data not available	5,385	2,112	545	2,087	293
OFO	50	Data not available	416	236	6	156	7

The pilot area intersects ten different wards and 18 community areas on the City's far South Side. Dockless bikes were intended for use within the pilot area only—any bikes parked outside the pilot area were to be locked down and retrieved by the vendor within 2 hours. Still, 14% of all trips ended outside of the service area, indicating users' interest in using dockless bikes for longer-distance trips to access key destinations. The pilot area was divided into four quadrants (see map on page two) to analyze the geographic distribution of trips and ensure that all residents had access to bikes.

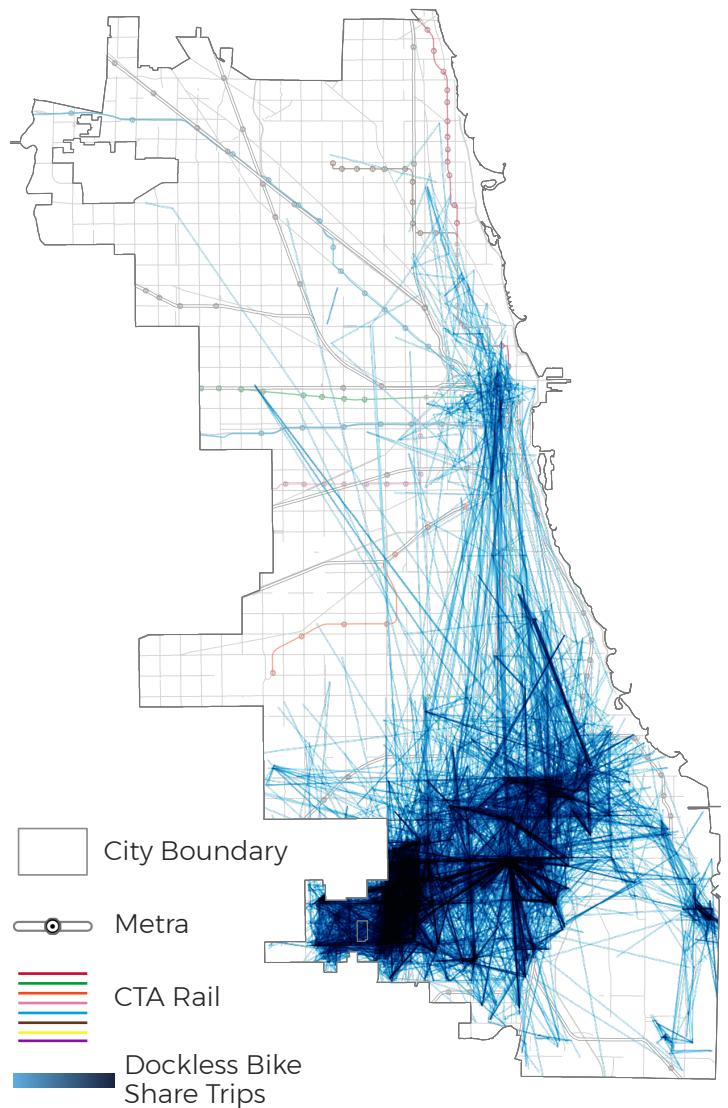
Quadrants 1 and 3 – the two western quadrants consisting primarily of the Auburn Gresham, Beverly, Mount Greenwood, Washington Heights, and West Pullman community areas-- saw the highest amount of activity, with nearly two thirds of all the trips during the pilot ending in these two quadrants (34% in Quadrant 1 and 31% in Quadrant 3).

Ending Point for Dockless Bikeshare Trips



The map below shows the straight-line distance connecting recorded origin and destination points (lines do not represent the actual route taken). The darker lines show a higher density of trips between common origin and destinations. Throughout the pilot, the average distance of trips completed using the dockless bikes was 1.9 miles.

Dockless Bikeshare Trips (straight-line distance)



Examining the locations throughout the pilot area where dockless bikeshare activity concentrated, there is a clear link between bikeshare use and public transportation. The Metra Rock Island District line stations at 95th St., 99th St., and 103rd St stations, as well as the CTA Red Line station at 95th St., were all among the most frequent starting and/or ending points for dockless bikeshare trips. In total, 21% of trips either began or ended within 1/10th of a mile of a transit station or stop.

Across the U.S., bikeshare use has been used most heavily by people between the ages of 18 and 34. Thus, it was not surprising that both Chicago State University (located at 95th St. and Martin Luther King Jr. Dr.) and St. Xavier University (located at 103rd and Central Park Ave.) were both popular starting and/or ending points for dockless bikeshare trips.

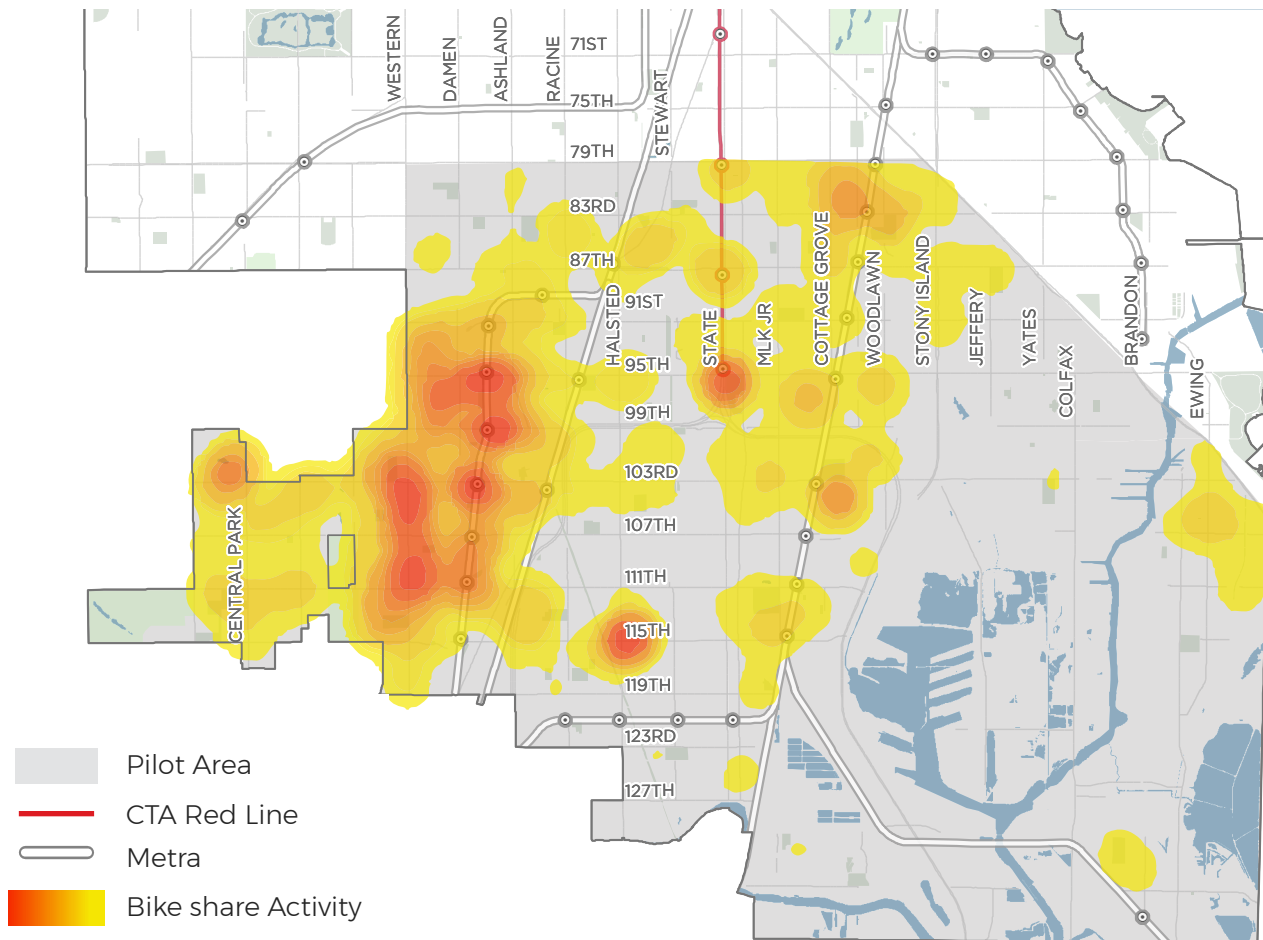
Another activity center was along Western Avenue between 103rd St. and 111th St. Stretching between Beverly and Morgan Park, this segment of Western Avenue acts as a primary commercial

center for the predominantly residential surrounding neighborhoods. The commercial center at Halsted St. and 115th was another popular destination. Beverly Park was another popular starting and ending point for dockless bikeshare trips.

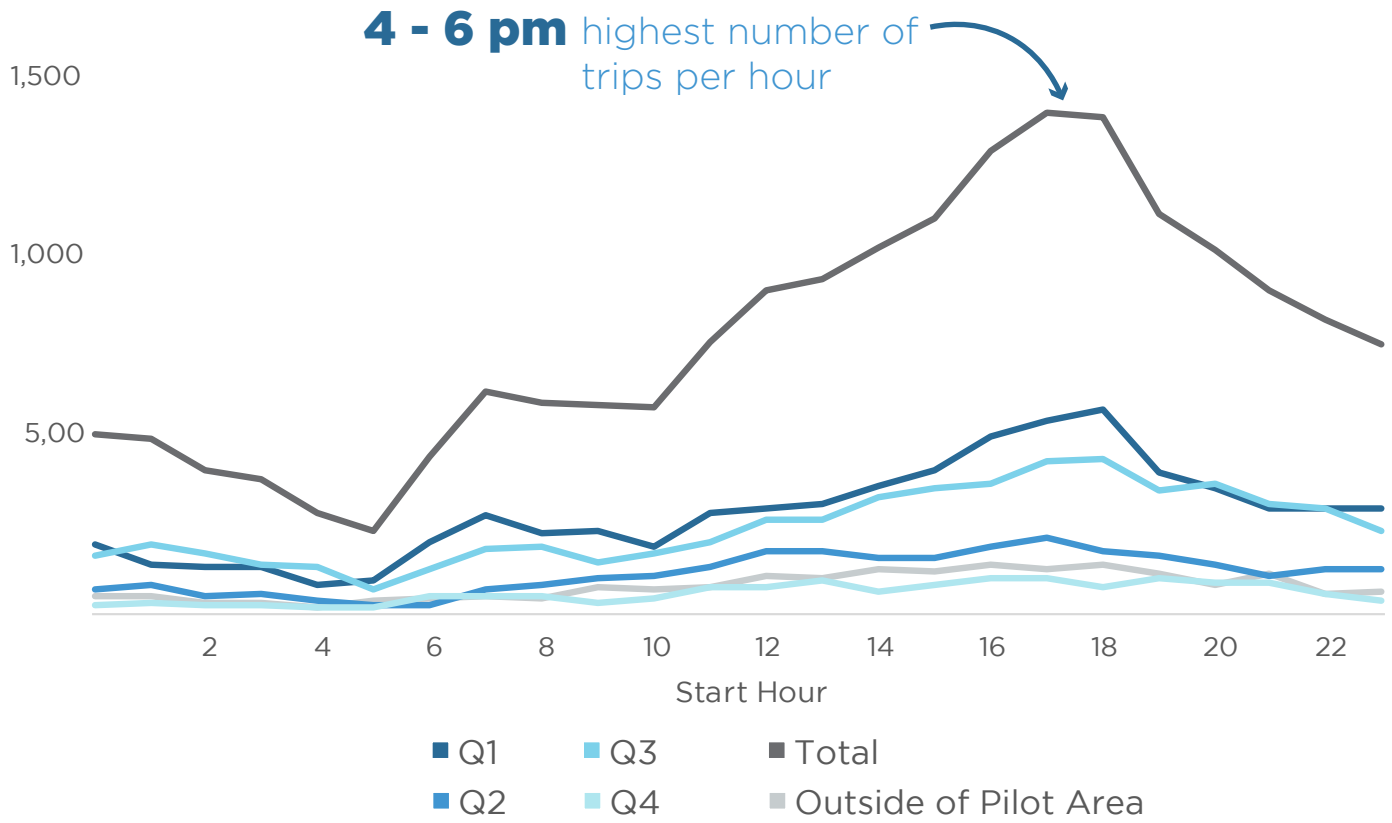
The majority (55%) of dockless bikeshare trips began between 12pm and 9pm. The busiest time of day aligned with afternoon commuting hours, with 22% of all trips beginning between 4-6pm. The pattern of usage was similar across each of the four quadrants within the pilot area.

Of the 18,525 trips reported during the pilot, 4,513 were missing data for the trip distance. Of the 14,012 trips for which trip distance information was provided, 5,295 (37.8%) were less than one mile while 3,232 (23.1%) were greater than three miles. 401 trips (2.9%) were reported as longer than 10 miles; however, these trips often lasted hours, or even days, and most likely consisted of users making multiple trips during one rental period.

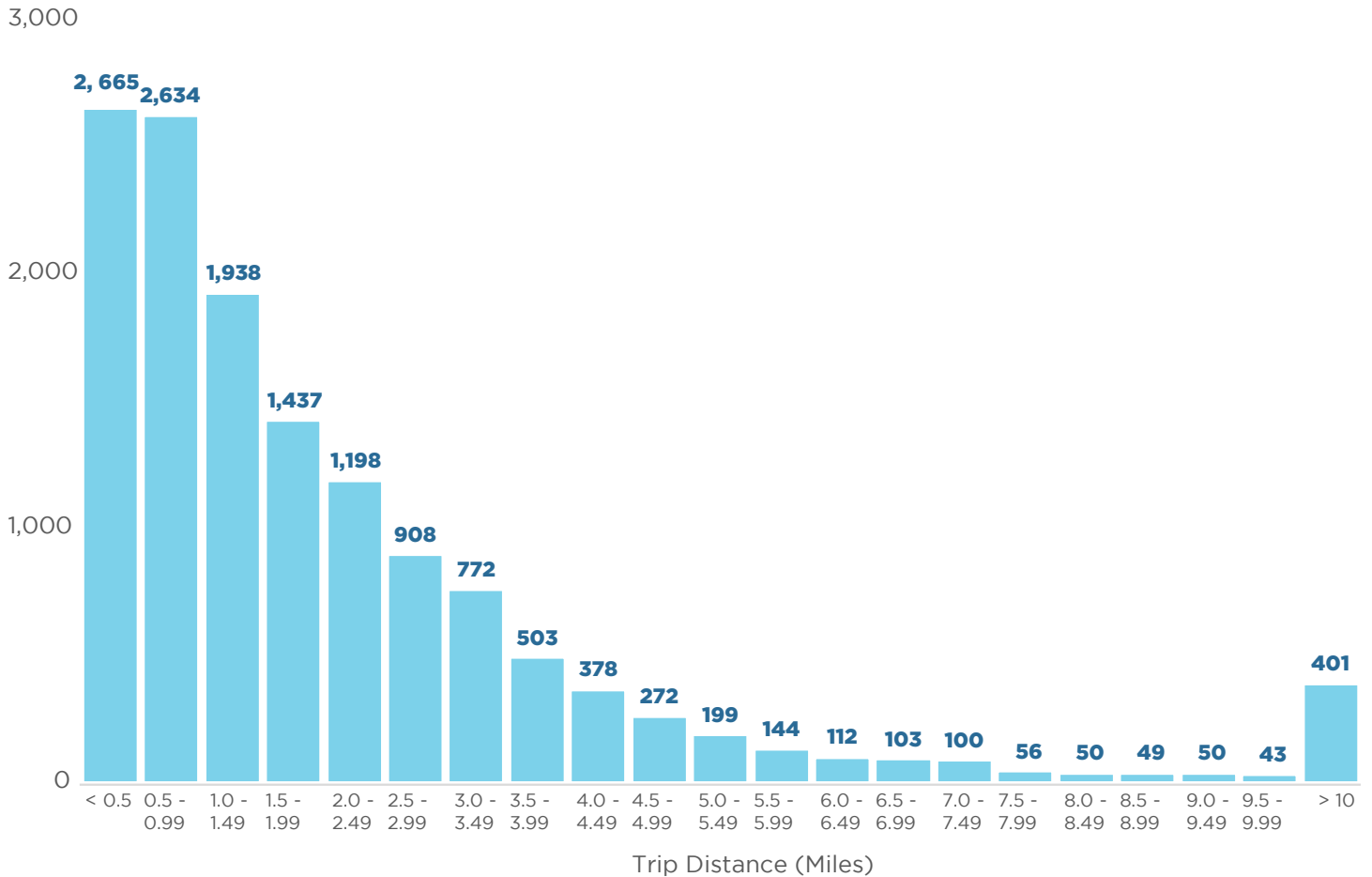
Bikeshare Activity Heat Map



Dockless Bikeshare Trips Per Hour

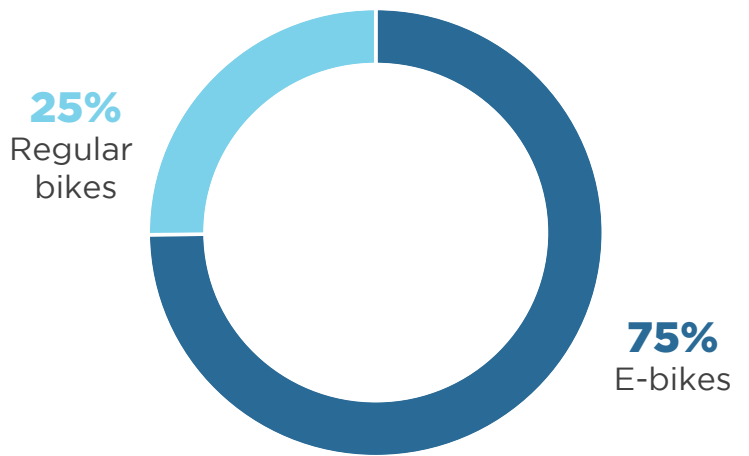


Dockless Bikeshare Trips By Distance

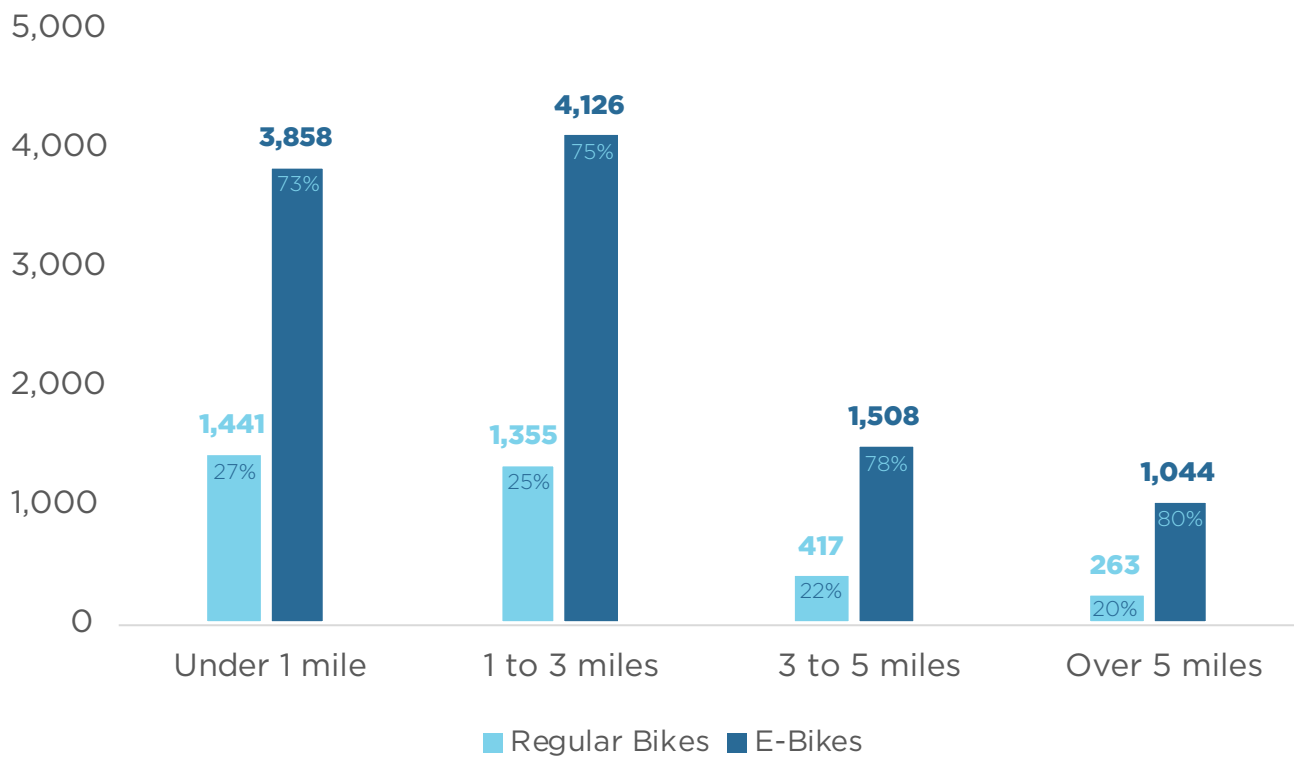


Of the 3,232 trips taken during the dockless bikeshare pilot that covered more than three miles, 79% were on bikes that offered electric pedal assist (Jump and Lime). Trips completed using Jump bikes had a significantly higher average trip distance of 2.4 miles compared to all trips taken during the pilot. These findings, as well as feedback received during a public survey conducted after the pilot (see Survey Results section below), suggest that bikes with electric pedal assist can increase the distance users are willing to ride and, therefore, enhance users' mobility and access to jobs and other opportunities.

Trips By Type Of Bike



Trip Distance By Type Of Bike



CUSTOMER REPORTS

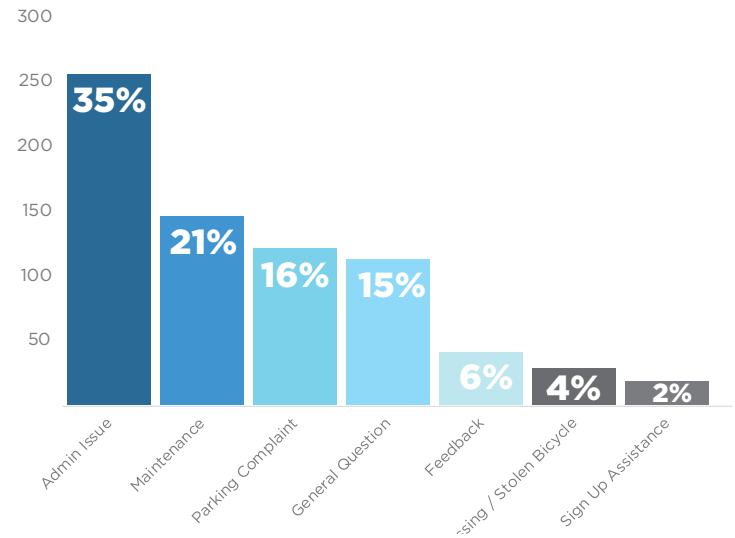
Throughout the pilot program, there were 735 customer reports submitted to the four participating companies for an average of 4.0 reports/day. The most common issues reported by customers were administrative issues (35%), maintenance problems (21%), and parking complaints (16%). The 'administrative issues' category included a broad range of customer reports, such as billing issues, problems with a smartphone app or user account, and general questions. It should be noted that not every customer report represents a user issue - users calling with general questions about the program or with requests for assistance to use the bike properly were also included in the dataset. Additionally, 28 bikes were reported missing or stolen during the six-month pilot, for an average of 0.15 bikes stolen/missing per day.

The majority of customer reports concerned Jump (75%), followed by Zagster (15%). Lime and Ofo, which were each limited to 50 bikes, accounted for 6% and 4% of the customer reports, respectively. On a per-trip basis, Ofo saw the highest rate of customer reports (77 reports/1,000 trips) followed by Jump (65 reports/1,000 trips), Zagster (25 reports/1,000 trips), and Lime (9 reports/1,000 trips).

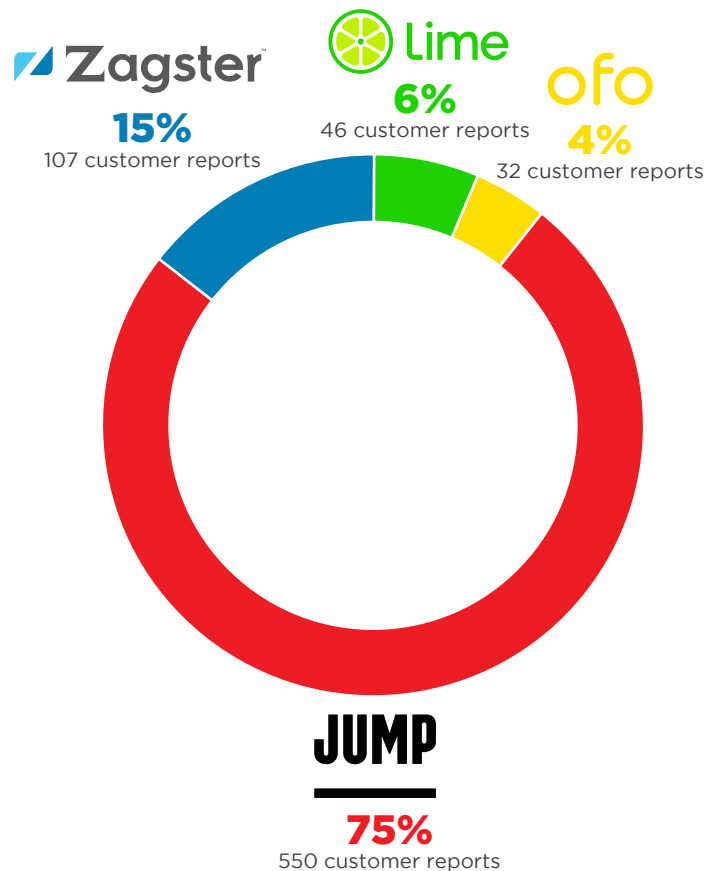
As dockless bikeshare has spread across the U.S., a primary concern has been that dockless bikes will be parked haphazardly, block public sidewalks, and be left on private property. Chicago's dockless bikeshare pilot incentivized participating companies to include a mechanism for locking their bikes to a fixed object to limit the parking issues that have occurred in other cities. During the six-month pilot period, the four participating companies received 125 parking-related reports, and the City received an additional 39 parking complaints via the 311 system. Between both sources, there were a total of 164 parking complaints, which averages to less than one (0.89) parking issue reported per day and one parking issue for every 113 dockless bikeshare trips. Additionally, only six of the parking complaints explicitly stated that the bike was blocking the sidewalk. For context, Seattle, which began piloting dockless bikeshare in 2017 and has grown to 10,000 dockless bikes,

found that 70% of bikes were wholly compliant with permit parking guidelines, 26% were not compliant but were not impeding access (e.g., blocking the sidewalk), and 4% of bikes were non-compliant and impeding access.

Customer Reports by Issue Type



Customer Reports by Company



CUSTOMER REPORTS

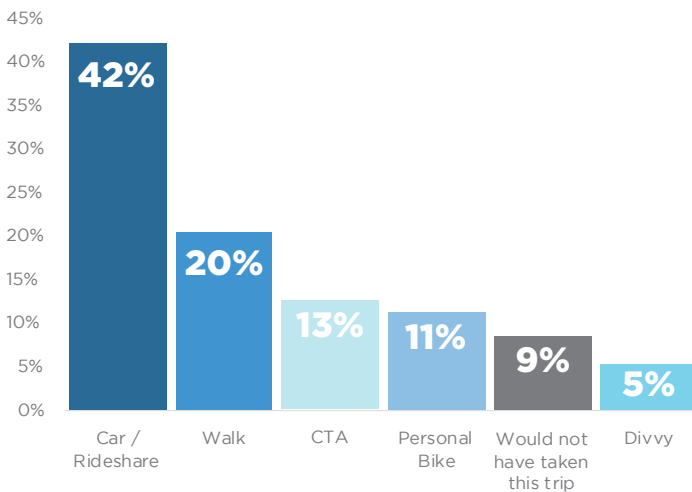
	JUMP		ZAGSTER		LIME		OFO	
	#	%	#	%	#	%	#	%
ADMIN ISSUE	201	37%	52	49%	2	4%		
SIGN UP ASSISTANCE	17	3%			1	2%		
MAINTENANCE	97	18%	22	21%	9	20%	17	53%
FEEDBACK	32	6%	3	3%	5	11%	1	3%
GENERAL QUESTION	98	18%	2	2%	3	7%	9	28%
CRASH	5	1%						
MECHANICAL ISSUE	11	2%						
MISSING OR STOLEN BICYCLE	25	5%	3	3%				
PARKING COMPLAINT	64	12%	25	23%	26	57%	5	16%
TOTAL	550		107		46		32	

NOTE: Blank entries above indicate data was not provided to the City by vendors.

SURVEY RESULTS

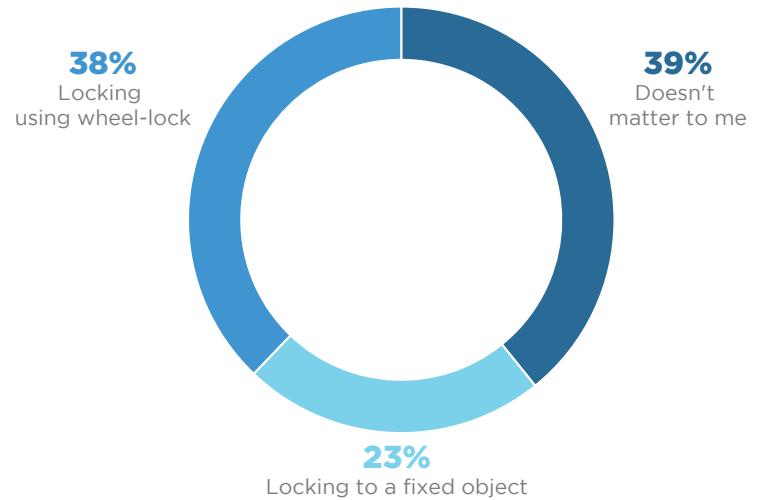
At the conclusion of the dockless bikeshare pilot, the City distributed a non-scientific survey to gather general feedback on the dockless bikes and the overall pilot process. The City received a total of 166 responses. Of those 166 respondents, 46% reported using a dockless bike a few times a month or more, including 10% of respondents who said they used a dockless bike daily; 33% of survey respondents reported never using a dockless bike during the pilot. The most common reasons for dockless bikeshare trips, according to the survey, were connecting to public transportation, recreation or exercise, and shopping or errands. According to the survey results, dockless bikeshare helped to reduce vehicle trips: 42% of respondents indicated they would have used a car (either as a driver, passenger, or using a taxi or ride share service) to make their trip if not for dockless bikeshare.

Q: If you had not used dockless bike share, how would you have taken the trip(s) otherwise?



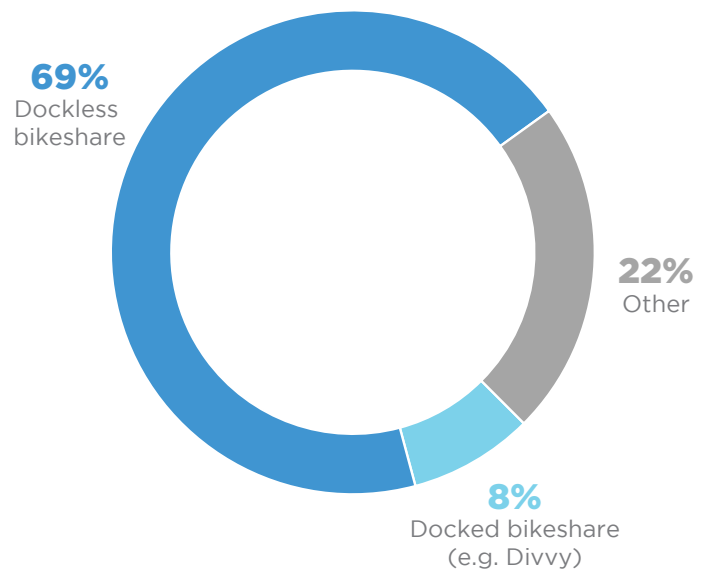
The four companies that participated in the dockless bikeshare pilot offered bikes with two different locking options: an internal wheel-lock (Ofo and Lime) or an external mechanism (e.g., cable lock or u-lock) for locking the bike to a fixed object (Zagster and Jump). Survey respondents did not indicate a strong preference among the different options: 23% preferred locking the bike to a fixed object, 38% preferred using the wheel-lock, and 39% selected that the locking option did not matter to them.

Q: Do you prefer locking the dockless bike to the bike's own wheel (using wheel-lock) or locking the bike to a fixed object?



When asked whether users preferred dockless bikeshare or a docked bikeshare system (like Divvy), 69% of respondents stated that they preferred dockless vs. 8% who preferred docked bikeshare. However, only 60% of survey respondents had previously ridden Divvy. In the survey's general comments section, other respondents indicated that they liked both types of bikeshare and that they would appreciate a hybrid system that included both docking stations and dockless bikes.

Q: Do you prefer dockless bike share or a docked bike share service (e.g. Divvy)?



Survey respondents were also asked which factors impacted their decision to use a dockless bike. The most important factor was access to a bike, with 82% of respondents rating this as important or very important, followed by ease of payment (71% important/very important), and proximity and ease of destinations (66% important/very important). Respondents were also asked whether the bike having an electric-assist feature was an important consideration and 47% indicated it was either important or very important. Jump and Lime both offered electric-assist bikes during the pilot, and these two companies accounted for 75% of all the trips taken during the pilot. One respondent added, “The electric pedal-assist on the Jump bike was life-changing. It’s hard to go back to a regular bike now! Divvy must evaluate adding pedal-assist bikes. It makes long trips seem much shorter and could seriously expand the market for riders.”

Survey respondents were also able to provide open-ended feedback. Over half of these comments (42 out of 83) were specific calls for the continuation and/or expansion of dockless bikeshare. Eight comments also called for the addition of dockless, electric scooters.

Survey respondents were not exclusively residents of the pilot area, in fact, 34% did not live on the South Side. Additionally, the majority of respondents were white (66%), male (62%), and under the age of 34 (52%).

CONCLUSION

Dockless bikeshare is one of many new mobility options being launched in cities around the U.S. by private companies. These new mobility options offer benefits to cities and their residents but also pose challenges. Chicago’s dockless bikeshare pilot was designed to better understand the benefits and challenges of dockless bikes and inform the City’s decision making.

Overall, the pilot demonstrated that there was demand for bikeshare within the pilot area and that private companies were able to operate at this scale without major disruption. Over 18,000 trips were taken during the six-month pilot and the participating companies only received 735 customer reports. The trip data from the pilot also illustrates the popularity of electric-assist bikes with users. Two of the companies participating in the pilot offered electric-

assist bikes (Jump and Lime), and these two companies accounted for 75% of all the trips taken during the pilot.

The pilot also provides evidence that multiple vendors offering similar mobility services can coexist and that users can navigate an environment where the services offered are similar but have small, significant differences (e.g., dockless bikes with wheel locks vs. lock-to technology). Most encouragingly, there were relatively few issues (less than one per day) regarding bikes being improperly parked, which may be a result of the City’s lock-to requirement, consumer education efforts undertaken by vendors, the smaller scale of Chicago’s dockless bike pilot relative to other cities’ programs, or a combination of these factors.

And while the sample size of the feedback survey precludes drawing major conclusions from the results, feedback was overwhelmingly positive (69% of respondents preferred dockless bikeshare) and many respondents called for the continuation and expansion of the dockless bikeshare pilot.

While the dockless pilot has provided the City with valuable information about the demand for and operations of dockless bikesharing, several important questions still remain as the City decides how to proceed. The dockless pilot was conducted within a small portion of Chicago, which provided evidence related to the benefits and challenges of the technology, but questions about how dockless bikeshare can scale across the City and whether demand and operations will differ significantly in denser areas with more jobs and transit options persist. The pilot area was also selected to provide access to bike share in an area not currently served by the Divvy bikeshare system, and it remains to be seen how dockless bikeshare and Divvy would interact should both services be made available in the same geography. The City will hold these questions and the pilot’s findings as valuable context to better inform efforts for expanded access to bikesharing for all Chicagoans.

APPENDIX

Chicago Department of Public Health Economic Hardship Index

The Economic Hardship Index compares social and economic conditions between Chicago communities. The hardship index is a relative composite index of six indicators: (i) crowded housing (percentage occupied by housing units with more than one person per room); (ii) poverty (percentage of persons living below the federal poverty level); (iii) unemployment (percentage of persons over the age of 16 years who are unemployed); (iv) education (percentage of persons over the age of 25 years without a high school education); (v) dependency (percentage of the population under 18 or over 64 years of age) and (vi) income (per capita income). The hardship index provides a more complete, multidimensional measure of community socioeconomic conditions than individual measures such as income or employment alone. A community with a high hardship score has worse social and/or economic conditions than a community with a low or medium hardship score.

Community Areas in Pilot Area Quadrants

Q1	Q2	Q3	Q4
Ashburn	Avalon Park	Beverly	East Side
Auburn Greshman	Burnside	Morgan Park	Hegewisch
Beverly	Calumet Heights	Mount Greenwood	Pullman
Chatham	Chatham	Roseland	Riverdale
Mount Greenwood	East Side	Washington Heights	Roseland
Roseland	Pullman	West Pullman	South Deering
Washington Heights	Roseland		West Pullman
	South Deering		

Wards in Pilot Area Quadrants

Q1	Q2	Q3	Q4
9	6	9	9
17	7	19	10
18	8	21	
19	9	34	
21	10		
34			