The landscape of US bike sharing and how Portland's Biketown fits in the picture

On the morning of April 4th, 2017, fans of Portland's young bike share program were greeted with unexpected news: a local group of vandals had slashed the tires, cut the spokes and otherwise abused 200 of the bright orange bicycles in the middle of the night. City Commissioner Dan Saltzman called the crime "senseless",[1] but a leaflet posted on one of the Biketown stations explained why a group calling themselves the "Rose City Saboteurs" vandalized one-fifth of the entire fleet: "Our city is not a corporate amusement park." At another station, one of the saboteurs spray-painted, "NIKE HATES THE POOR" on the station kiosk.

This is far from the only negative response Portland's first modern bike share program has received. While it appears many businesses [2] are benefiting from the increased mobility of tourists in the city, others have not. Those businesses include bike rental shops, the original drivers of bicycle tourism, which are being forced out of a city that professes love for the local entrepreneur. "It's pretty hard to compete with one of the biggest marketing forces in the world behind Coca-Cola and El Chapo",[3] said the owner of one struggling store in reference to Nike, the corporate sponsor of Portland's publicly owned bike share program.

Bike share programs have been all the rage since the electronic pay and information systems technology needed for them to work came about in the mid-2000s. And they show no sign of stopping: in the US, there are now over 170 municipalities[4] with programs and the number of bike share trips taken nationwide jumped from 2.3 million in 2011, to 28 million in 2016.[5] While most Biketown users may not care about corporate branding when they consider the problems in American urban transportation that bike shares could fix, it is important to note that city residents will always be uniquely passionate about transit, and react accordingly.

Cities from Shanghai to London, Montreal to Houston have started their own bike share programs, largely with praise from local and international media, as well as environmentally conscious citizens. Not every bike share has seen success. Seattle's Pronto program, DC's BikeShare, and Montreal's Bixi are examples of programs that failed to some degree, yet their host cities were determined enough to start new and more lasting programs. But why did their first attempts fail? And why did these cities stick with the idea rather than refocusing their subsidies somewhere else? It seems that a lot of cities could be latching onto a new craze before considering whether it is the right fit for all members of their community, especially those with disabilities and those unfamiliar or uncomfortable with biking. In the case of Portland's Biketown, the program has been painted in the media as wildly popular among tourists, but Portland's climate limits year-round tourism as well as biking outdoors.

In this essay I look at how bike share technology has progressed in the last 60 years, why communities pick bike share programs, and what challenges bike shares face as the potential future of American urban transit. The purpose of this essay is not necessarily to inform the folks behind Biketown or at the Portland Bureau of Transportation (PBOT), but to serve more as a guide that would be most useful in the hands of a planner in a city that is considering a bike share program for the first time.

How far has bike sharing come since 1965?

In the Internet Age it is much harder to register rapid change in technology than it used to be. However, comparing the progress of bike share technology in the US over the last 7 years to the progress of auto or train systems in their first fifty years reveals just how dynamic its development has been.

Think about it this way: the first bike share in the world came about in Amsterdam in 1965, while the first in the US was Portland's Yellow Bike Project in 1996. Both used essentially the same concept, with the same technology and distribution systems. Echoing their European sources of inspiration, the Yellow Bike Project spray-painted 200 ordinary street bikes and simply let them loose in Portland. Tags attached to the yellow bikes read: "Free community bike, use at own risk." And that was it! That was the entire system. And despite theft, destruction, and abandonment of the yellow cruisers at the bottom of the Willamette, the almost adorably socialist program lasted for 3 years and started a new conversation around Portland as a bike town.

Today programs, including Portland's current Biketown program (launched 2016), NYC's Citibike (2013), and Capital Bikeshare (2010), are able to stay in business thanks to modern GPS, electronic docking stations and payment kiosks, and bike frames that look like they were designed by someone trying to win "Best Truck in Its Class." Unlike the Yellow Bike Project, modern programs are strategically introduced into a city, with the placement of stations seen as critical to their success. These programs are often made possible thanks to business-minded private-public partnerships (or, in New York's case, entirely private) and as a result have a far greater amount financial and marketing support, as well as a handful of government subsidies. Ryan Rzepecki, CEO and founder of a company that provides the bike technology for bike share across the country (including Biketown), described the rapid growth of the industry: "Bikeshare has gone from a slow moving, heavily regulated government program to one of the country's fastest moving tech investments, from a single-player monopoly to a multi-player marketplace."[6] While Rzepecki may be overlooking the role local governments have played in boosting bike shares, he is right about tech investments.

For example, Biketown's "smart bike" system lets users sign up for the program and reserve a bike ten minutes ahead via a smartphone app, and unlock a bike via an attached keypad (allowing users to skip any lines at the kiosk). Biketown bikes also have their locking mechanism attached to the bikes, rather than the stations, allowing riders to lock their bikes up to any public rack as they please. This is unlike New York's Citibikes program, which require riders to find an empty slot at a station in order to end their ride, adding time to their first mile-last mile transit. Biketown also uses a scaled pay system that rewards users for helping out: while a $2 fee is added if you leave your bike at a public rack ($20 if it is outside the service area), users can also be given credit in the system for returning bikes to empty stations. These "Bike Bounties" can be applied to any service or fee within Biketown. Older programs like DC's Capital Bikeshare initially charged for a day pass, not a single ride, making it difficult for someone testing the waters to justify spending $8 and extra minutes finding an open space to get to work. DC has caught on to the Biketown pay scale, changing their system to include a "single ride fare" in 2016.

In another dramatic change from the 90s, Biketown also caters directly towards riders unfamiliar both to bike shares and the city. Evidence for this can be found in the maps and planned routes provided to riders on the app and at kiosks. Three of these routes take users to the very bike-friendly and touristy Esplanade path, Tillicum Crossing, and Waterfront Park path. The fourth route, "Eastside Neighborhoods and Greenways" takes users to Central Eastside district. While the route is less sheltered, it does suggest "low traffic streets" and offers bike lane alternatives. The most popular Biketown station is located near a tourist hot-spot, Salmon Street and Naito Parkway, and other popular stations are near bike-friendly pathways like the Esplanade and downtown shopping areas. Additionally, local businesses seem to be benefitting from Biketown as tourists are using the bikes to visit restaurants and stores that would have otherwise felt out of reach.

In the first six months, Biketown logged 160,000 trips that covered over 312,000 miles. A total of 3,000 people signed up for annual membership, and 26% of riders said they chose to bike instead of using a car at some point. These metrics encouraged many to see the program as a success, but this does not mean that the Biketown formula would work in any city, nor that it creators are finished making adjustments.

How is bike sharing different from personal bike use?

Intentions of City Hosts

Proponents of bike shares typically cite the economic benefits from decreased road congestion and the increased mobility of residents. Other benefits, such as boosting the mental and physical health of residents, are also frequently mentioned by elected officials, as is general increased safety for cyclists. Houston's, Tampa's, and Pittsburgh's mayors are among many who have mentioned the importance of drawing in "younger" or "Millennial" talent looking for "livable cities with amenities like this that improve their quality of life."[7] Interestingly, the benefit of lowering the human impact on the environment appears less often, if at all, outside of the biggest programs. This hypothesis is based on a random selection of press releases and clippings from the mayors of Houston,[8] Albuquerque,[9] St. Paul,[10] Pittsburgh,[11] St. George,[12] Tampa, and the Bay Area[13]. One exception reveals the extent to which reducing a city's carbon footprint is considered as a benefit, but not the primary goal. In 2017, Louisville Mayor Greg Fischer described the City's upcoming bike share as tying together, "our goals for quality of life, multi-modal transportation, sustainability and wellness, along with talent attraction and retention."[14]

A 2012 press release from Nashville Mayor Karl Dean announcing the launch of the City's B-Cycle program lays out a concise and standard pitch for cities that are considering a bike share: "Nashville B-cycle is one more way that we can make Nashville a more bike-friendly city and inspire people to embrace healthy, active living. The strategically located kiosks will make getting around our urban core even easier and more convenient for workers, residents and visitors."[15] The key element here is that this is a "strategically located" system, not a system intended to create a new public transit service for every type of commuter.

Compared to academic literature, statements made by local political leaders and private promoters alike also tend to emphasize what bike shares can bring to the tourism industry.

"(Bike sharing) is sort of a tourist attraction in itself," said Puget Sound Bike Share Executive Director Holly Houser back in 2013 about the then-upcoming Pronto bike share in Seattle. "You see (bike sharing systems have become very iconic in the cities that they are in. I mean, I would go to New York just to check out their bike share system", she added.[16] There is some evidence behind this sentiment. In a 2016 report, PBOT announced, "56% of BIKETOWN tourist riders surveyed said that bicycling opportunities were a factor in their decision to visit Portland."[17] Whether they came for biking in Portland in general or to try out Biketown is not clear from this report, but it demonstrates to other cities considering bike shares that they can be a factor for bicycle tourism.

Another benefit in building bike share infrastructure is the increased mobility of tourists in downtown areas. The promise that bike shares will be a boon to local businesses once considered "off the beaten path" also seems to hold up: among non-member users of DC's Capital Bikeshare program, two-thirds were from out of town, and the PBOT reported that, "among tourists using BIKETOWN, 71 percent said they rode an orange bike to *reach* stores or restaurants" (emphasis mine). [18]

Differences in Safety

Perhaps the most astounding fact in America's short history of bike sharing is that, between 2010 and August 2017, only two[19][20] people died in a traffic collision while riding a bike share bike. Meanwhile, 817 cyclists[21] riding outside such programs were killed in 2015 alone. This should come as a surprise to just about everyone, especially bike share critics who were concerned about inexperienced riders riding in streets with inadequate bike infrastructure. The fact that 2015 was the deadliest year for bicyclists since 1995, with a 12.2% increase in fatalities over 2014, and not a single bike share user was among them suggests there is something truly different between the two bike modes.

It is difficult to determine exactly why bike sharing is as safe as it is, especially considering that almost zero cities have a mandatory helmet law for bike share riders. One study[22] makes a crucial point about bicycle fatalities: "the majority of fatal bike crashes- 72% took place on the roadway rather than at intersections." While a majority of deaths (70%) took place in urban areas, a 2016 report Martin et al (2016) indicates that biking is most safe in the densest parts of the city, as this is where more stops at intersections and reduced speed limits ensure slower driving. In most cities, the densest parts of the city are also where bike share stations are concentrated.

The Martin et al report[36] also notes that the design of bike share bikes encourages riders to bike safer: "because bike sharing bicycles are designed to be larger, slower and sturdier than personal bicycles, they are not ridden as aggressively as personal bicycles. Members of the bike sharing focus groups noted that people riding bike sharing bicycles appeared to do so more cautiously" (58). The authors made clear that biking is always safer with a helmet, but that helmet use is clearly not the cause of the low fatality rate in bike sharing, as helmet use "is widely documented to be lower among bike sharing users" (58). This is good news for bike share operators, because providing helmets to riders is far trickier than one might think. For one, if a program is going to prevent its helmets from being stolen, it will likely have to install the same GPS technology it uses to keep track of its bikes. Apart from the cost of this installation, the providers would have to come up with a helmet design that is tough enough to prevent thieves from removing the GPS device. Secondly, and this has been commented on many times, maintaining hygiene standards in a citywide helmet share is a serious challenge. Seattle and Boston did find a way around this with helmet vending machines. In essence, the user pays a small separate fee for the helmet and drops it in a bin at the end of their ride. From there, the helmet is taken directly to a warehouse and cleaned. If this sounds costly and inefficient, Houser told the Washington Post that the vending machines added $850,000 to a $4.4 million budget.[23]

Problems with bike shares as a form of public transit:

Equity challenges

As indicated above, safety is shockingly not as much of a problem with bike shares as initially expected. But that does not mean there has not been justified concern over the capacity of bike sharing to function as a form of public transit.

When looking at recent scholarly articles on America's bike share programs, it is clear that equity is a growing concern. Authors studying bike share programs in the US have noted that this new form of public transit comes with many of the old private transit problems, mainly that these programs are most popular with people who are not disabled, not elderly or young, not a person of color or immigrant, and not a woman.

A 2017 study by Howland et al (2017)[37] listed the barriers to equity that can be addressed, noting that station siting, pricing structure and payment systems are the most often cited barriers to a more diverse user population. This study also found that while 23% of bike share systems "have written policies around equity", and 57% "considered equity in their promotion" (20), a lack of specificity was prevalent in policy statements regarding this problem. In general, larger systems were more likely to have made equity an explicit priority, although the authors suggest that this may be a result of these cities having more resources to work with. Interestingly, the operating model can also have an impact on a system's ability to create equity. As private (such as Divvy in Chicago) and private-public bike share models rely on user and advertising revenue, "the profit motive in private funding may foreclose the possibility of locating stations in what may be low-use areas but would help reach targeted equity populations" (2). In essence, if a population is already less likely to use a new transit system due to historically reinforced segregation or social perceptions, they will in turn be ignored in the marketing and siting process. These authors found that "only four of the larger bike share systems locate over 40 percent of stations categorized as having high economic hardship"(1).

It is not without reason that for some populations biking around cities is inherently more difficult and often dangerous. Research by Kahn (2017)[24] has shown that pedestrians of color are more likely to be victims of traffic accidents at crosswalks due to racial bias. As it is implicit biases that makes drivers "less likely to stop for Black and male pedestrians, and when they did stop, they were more likely to stop closer to Black male and Black female pedestrians", it is fair to assume that the same would apply to bikers of color. However, it appears that not enough research has been done on this subject. A report from the Chicago Tribune revealed that people of color in the city are far more likely to get ticketed for bicycling infractions: while "Enforcement for bike citations has shot up citywide in recent years- from 468 total tickets in 2010 to 3,301 in

2015, or about seven times higher. In the majority black area of North Lawndale- the increase was 23 times higher, from 8 to 185."[25] This has been attributed both to implicit racial bias on the part of the police officers, as well as a lack of bicycle infrastructure. As the lack of infrastructure is tied to a history of service segregation, many local advocates have described the higher rate of citations as systemic racism. This truth is a particularly grating revelation as the City of Chicago has simultaneously encouraged all Chicagoans to bike more with programs such as Complete Streets and events like Chicago Bike Week.

To address the problem of engaging populations of color and low-income groups, cities have started to insist that their bike share payment system does not rely solely on apps or credit cards. Local advocates have stressed that the equitable distribution of stations should be matched with coordinated community outreach efforts from the city, non-profits, and the bike share programs themselves. One example of basic outreach is Chicago's Learn to Ride program,[26] which offered free 2-hour classes in the summer of 2017 and was provided for by a partnership between Divvy, the Department of Transportation, and Illinois' Blue Cross and Blue Shield. Biketown has tried to make itself more accessible by dropping the monthly membership from $12 to $3 for low-income residents, but the problem with station siting remains.

Scholars have also addressed the potential connection between bike share programs and gentrification nationwide. Look at the map of Biketown stations in East Portland, for instance, and it appears that bike share service is tracking the path of gentrification into the NE districts, even if other nearby neighborhoods (e.g. Hollywood) are just as accessible to downtown. In the cities of Portland and Chicago, Flanagan et al (2016) found that "marginalized communities are unlikely to attract as much cycling infrastructure investment without the presence of privileged populations, even when considering population density and distance to downtown, two motivators of urban cycling" (abstract). Another aspect of frustration toward bike shares-as-public-transit is that communities currently isolated from Biketown access might get a station only when their rents are increasing to the point where they will have to move to a different, bike-inaccessible neighborhood.

Another contentious point in bike share equity is that most bikes are not designed for disabled riders. As the average weight of bike share bikes is 45lbs, approximately 27lbs heavier than the average street bike, commuters who are physically disabled, young children, or elderly are currently excluded from modern bike share programs. To address this problem, the City of Portland, Biketown, and a local bike rental company (Kerr Bikes) worked together to initiate the pilot season[27] of America's first "adaptive" bike rental program in 2017. With $30,000 USD in funding from PBOT and a $10,000 gift from NIKE, the program aims "to increase biking access to people with disabilities" via specially designed bicycles. These adaptive designs include hand-cranked bicycles, tandem bicycles, and tricycles.[34] Unlike Biketown, this program will be operated by Kerr Bikes, and there are differences in the pay scale, while a few new amenities, like service animal crate storage, have been added. As the trial season has just ended, it is difficult to say how this program will proceed (there is an unfortunate dearth of studies of the subject on Google Scholar). However, there are a few challenges to an effective adaptive bike program that can be gleaned by Biketown's announcement. First, some disabled users may require assistance to use the bikes (a service Portland's program stated it would not offer). Second, the unique designs of these bikes makes it more difficult to fully integrate them into the system without redesigning the stations to some degree (the pilot season operated out of an existing bike rental location, and riders mainly stayed on nearby bike trails and pathways). Both of these problems are limiting to any promise for a more equitable bike share for disabled cyclists, but we will know more about what the City and its partners have planned when the second season begins in March, 2018.

In order to address these problems, proponents of equitable bike share programs should pursue new avenues for securing adequate funding at the state and federal levels. This might be difficult as bike shares current operate in a gray area when it comes to asking for federal grants, but political support exists and can be leveraged. In 2016, Oregon congressman Earl Blumenauer introduced the Bikeshare Transit Act to Congress. The purpose was to officially define "bikeshares" as a form of transit in US code, making "bikeshare systems eligible to receive funding to enhance related public transportation service or transit facilities."[28] In a sentiment that reflects the broad appeal of bike shares, even in federal politics, Blumenauer cited their ability to "drive economic development." The act died on the floor, but a similar bill that would allocate much need federal funds would greatly improve the ability of bike shares to tackle inequity in their system.

Weather and Climate Challenges:

On top of the social, physical, and economic constraints of universally accessible bike share programs, there is also the problem of climate. One study by Kutela and Kidando found that outdoor temperatures and weather were linked to Bikes Idle Duration (BID) in Seattle's Pronto system. While the summer season saw the highest ridership in 2014/15 (36% of rides taken that year), winter accounted for only 14.4% of the rides. Furthermore, "bikes were more likely to remain idle for about 11.6 hours when there were rain and snow compared to clear condition" (43). Worse still, the authors found that rain increased BID by .6 hours, and every inch of precipitation grew that number by another 4.5 hours. Similar to Seattle, Portland bicyclists are confronted by long and dark winters, and the two cities have similar amounts of annual rainfall. Kutela and Kidando recommend that cities address the problem of inclement weather-induced idleness by removing some bikes from the system during the winter as a cost-saving measure. For cities with inclement weather, heaver tires with better surface grip might be called for.

Two examples of what can hurt or defeat a bike share

Another challenge to the success of bike share systems is vandalism. Both Portland's and Baltimore's systems have had to spend large sums of money to retrieve, repair, and in some cases replace both bikes and stations. I could not find a dollar figure for how much mass-vandalism described at the top of this essay cost Biketown, but after one business day only about a dozen of the affected bikes had been repaired, presumably costing the program a considerable amount of money in lost ridership hours. In Baltimore, a design flaw in its stations allowed vandals to rock the bicycles out of their locks. The stolen bikes would later be abandoned, and the program had to pay for the retrieval process. Some of these vandalized bikes required 12 hours of repair before they were put back in the system. At one point in August 2017, around 100 of Baltimore's 230 bike share bikes were out of service.[30] The extent of the damage was severe enough that an expansion of the program was pushed back in order to retrofit the stations with more secure locks. While the program's vendor, Bewegen Technologies, paid for the improvements, other negative impacts were felt in the public sector, including the local police department having to file charges of theft and destruction.

The failure of Seattle's Pronto bike system, which operated from 2014 to 2017, has been blamed on a number of factors. An uncommon all-ages helmet law, lack of political will, and a restrictive pricing system (flat $8 per day) have been mentioned, but lack of density and destination options appear most responsible. For example, users would leave their bikes outside of brewpubs in Fremont because there were no stations nearby. As the University of Washington branch was included in the grant process, underperforming stations were essentially built into the system when it opened. By focusing on connecting locations like the U-District (and the proposed Rainer Valley branch), the Pronto system had a station density of only 7.5 stations per square mile.[29] Bikes at these far-out stations saw only .3 trips per day compared to 1 trip/day in the core of the system (for comparison, a bike in DC's system gets 5 trips/day on average). Pronto offers some proof that, if a city wants their bike share program to get use, concentrating the initial stations in a high-demand area is best. While some may point out the inequity of such a launch, it is up to the program directors and city leaders to decide the balance between inequity and functionality.

Are Bike Shares the next step in American public transit?

In this era of divisive politics, when solutions praised by members of one party evoke moral outrage from the other, it is oddly gratifying to look at the map[31] of bike share programs in the United States. Just about every state in the Union has a bike share program of some kind or one in the works (ahem, Montana). These programs range in size from 20 bikes at 5 stations in Conway, Arkansas,[32] to nearly 6,000 bikes at 576 stations in Chicago, and have been brought into existence via partnerships between large corporations (Citi Group), non-profits (Bike Share of Austin), entrepreneurial start-ups (Zagster), the Federal Transit Administration (via grant programs), universities (Cornell, Texas AM), and the host localities. Modern bike shares are most associated with big, liberal cities, but small towns (Jackson Hole), corporate campuses (Google headquarters), and universities have also picked up on the movement.

As far as public transit goes, there are plenty of obvious advantages in bike share programs. Unlike rail or bus infrastructure, remaking a city to be bike-friendly is relatively cheap and easy. Whereas making room for the automobile in the city in the 20th century required destructive street-widening measures and urban highways, as well as traffic laws that make life harder on pedestrians, bike share infrastructure has a far easier time integrating with the city environment. Unlike streetcars, the other public transit option that has seen a revival in the last few decades, bike share stations are both low cost to install and can be picked up and moved if a more ideal location is found. The highest operating cost- redistributing bikes to empty stations- can be reduced by creating a reward system similar to Biketown's.

However, the bike share industry is ripe for disruption at the moment. Despite Capital Bikeshare's popularity, there are now three private competitors[33] that have introduced station-less bike shares into the city. As evidenced in China's massive bike share graveyards, station-less systems can quickly become a nuisance rather than an effective form of public transit. Plus, the need for credit cards and smartphones makes these programs inherently limited. It is likely that electric bike shares will be another disruptor in the next few years, but as electric bikes significantly decrease the health benefits of biking, have presented a safety problems in other cities (like Tel Aviv[35]), and come with batteries that are harmful to the environment, it will be interesting to see if some municipalities hold steady on good ol' pedal bikes.

Even with all of these social and technological feats, and a promise of even better systems in the future, pushback against fully public and integrated bike share systems remains (although much of it appears to come from the fiscal conservative angle, not necessarily bike haters).

Perhaps this is to be expected. Modern bike sharing in the United States is younger than the existence of iPhones, and its potentially transformative effect on American transit is not yet widely felt. However, proponents should bear in mind that full adoption of new technology into public transit has always been a slow process. After all, it took almost fifty years before the New York City Transit Authority took over operations of the city's subway system. Fortunately, it will be far easier to repaint and shift around a bike share system than it was to connect the tunnels of New York's byzantine subway lines.

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