Evaluation Study of the Bike Share Program in Fargo, North Dakota: Executive Summary

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Abstract

Great Rides Bike Share launched in 2015 in Fargo, North Dakota, with 11 stations and 101 bikes. This study evaluates the impacts of the program through a series of surveys and statistical analyses. Objectives were to understand user opinions, analyze demand, study impacts on student travel behavior, and analyze livability benefits. Regression analyses were conducted to estimate the impacts of weather and other factors on bike share use in Fargo and to estimate the impacts of bike share use on bus ridership.

Introduction

This study investigated the effectiveness of the Great Rides Bike Share program that was launched in Fargo, North Dakota, in March 2015. Eleven bike share stations were introduced in Fargo with 101 bikes. Bike share stations are primarily concentrated on the North Dakota State University (NDSU) campus and in downtown Fargo.

The study conducted three online surveys. Two were sent exclusively to NDSU students, while the other was distributed to both NDSU students and others who use the bike share program. The first survey was conducted before the launch of Great Rides Bike Share and the other two after the launch. Surveys were conducted to understand the NDSU students' and bike share users' perceptions of the new bike share program in their community, before and after travel behavior, modal shifts, and preferences for additional bike share locations.

More than 95% of bike share trips in the first two years of operations were made by NDSU students. Therefore, the three surveys were primarily conducted with NDSU students, though survey 2 attempted to reach all possible users. Survey 1 was conducted in March 2015 and received 860 NDSU student responses; survey 2 was conducted in October 2015 and received 654 NDSU student and non-NDSU user responses, 92% of the respondents

Figure 1. Great Rides Bike Share Station near NDSU's Memorial Union

were again NDSU students; survey 3 was conducted in April 2016 and received 483 NDSU student responses. Surveys 1 and 3 included several of the same questions to understand changes in travel behavior, attitudes towards the bike share program, and use among NDSU students. Origin-destination trip data were analyzed to understand bike share station demands and user travel patterns.

Regression analyses were conducted to estimate the impacts of weather, spatial, and temporal factors on bike share use and to estimate the impacts of bike share use on bus ridership. The study examined mode shifts and whether bike share has a substitute or complementary relationship with transit in Fargo.

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Perception of Great Rides Bike Share Program and User Preference of Additional Locations

Before the launch of Great Rides Bike Share, a significant majority of students knew about the concept of bike sharing, and some had used a bike share program in a different city. By the beginning of second year of operations, about 32% of NDSU students surveyed had used the bike share program. Students most commonly used bike share to make trips on campus, though some trips were also made between campus and downtown or between locations downtown. When asked where they would prefer to see new stations added, students most commonly mentioned the T-Lofts Apartments/T-Lot, which is located south of NDSU campus (primarily for commuting to campus and returning from campus); Northport Hornbachers (primarily for shopping purposes); Minard Hall (primarily for attending classes); FargoDome (primarily for students using park and ride services); and near a row of apartments south of campus (primarily for commuting to campus and returning from campus).

Travel Behavior and Modal Shift due to Bike Share Program

Travel behavior was analyzed for students traveling to campus, traveling on campus, and traveling between the main campus and downtown. University Village/Niskanen Apartments (UV/NA) is an NDSU housing option located approximately one mile from the NDSU Memorial Union. A majority of UV/NA residents use MATBUS as their primary mode of travel to campus, which was the case both before and after the launch of the bike share program. The most important factor influencing the mode of transportation used to travel to campus for UV/NA residents is the weather. Travel time and convenience are also important factors. After the bike share launch, 8% of UV/NA residents responding to the survey began using bike share as their most common mode of travel to campus, and 66% started using the program at least on occasion for traveling to campus. These observations show that bike share is being used as major mode of travel by UV/NA residents.

More than 55% of NDSU students responding to the survey lived off-campus, and a majority of them lived in North Fargo. The most common mode of traveling to campus for these students is driving alone, but mode shares vary significantly depending on how far the students live from campus. Mode shares for walking, bicycling, and riding MATBUS are large for students closer to campus.

The number one factor influencing the mode of transportation used to travel to campus for off-campus students is travel time. Weather and convenience are also important factors. Survey results suggest there could have been a slight decrease in walking and using MATBUS to travel to campus after the bike share launch. Because bike share stations are primarily located on NDSU campus and downtown, there are no bike share stations near any major off-campus student housing locations other than downtown. Therefore, a small percentage of off-campus students use bike share to travel to campus.

Students most commonly walk when traveling on campus, though MATBUS provides many trips on campus, and some students ride bicycle or drive occasionally. The survey found that 43% of respondents had used bike share at least occasionally for traveling on campus. The results show a slight modal shift towards more bicycling on campus. Walking and riding MATBUS may have decreased, but it is difficult to determine from the survey results.

Seven of the 11 bike share stations are located in downtown Fargo. Downtown stations are approximately 1-2 miles south of the NDSU main campus. Two of the downtown stations are near the NDSU downtown campus. More than 63% of NDSU students responding to the surveys travel to downtown Fargo. Riding MATBUS and driving alone are the modes mostly used to travel between campus and downtown. Survey results showed that during non-winter months, 10% of respondents most commonly used bike share for traveling between campus and downtown and 7% most commonly used a personal bicycle. Responses indicate an overall increase in bicycling activity between campus and downtown, though its overall impact on bus ridership and automobile use is difficult to determine based solely on the survey results.

Ridership Data Analysis

The study analyzed ridership data for 2015 and 2016 to understand bike share trip patterns. A total of 138,463 bike share trips were made in 2015; 95.4% of the trips were made by NDSU students, 1.4% were made by bike share members, and 3.2% were made by guest users. A total of 98,767 trips were made in 2016, 96.1% by NDSU students,

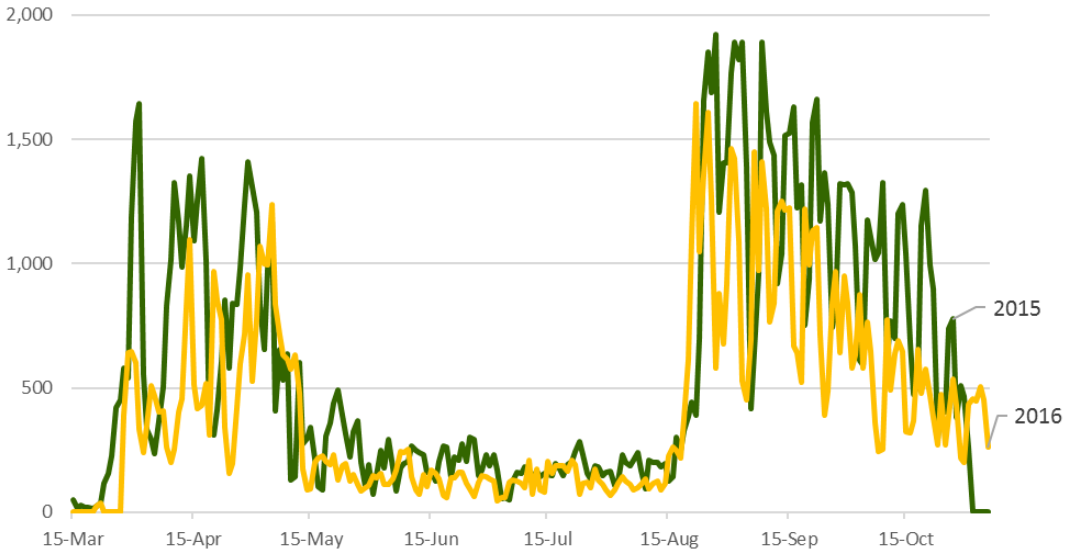

Figure 2. Great Rides Bike Share Trips per Day, 2015-2016

1.0% by bike share members, and 2.9% by guests. Bike share trips declined 29% in the second year of operation, which could be due to the novelty wearing off. Overall use in 2016 was still good for a system of its size, and with just two years of data, it is not possible to determine if the decline is long-term trend or just a one-year drop to a more sustainable level of use.

Most users are NDSU students, so bike share ridership dropped substantially during the summer months because there are significantly fewer students on campus (see Figure 2). Ridership also varies throughout the day. Bike share checkouts increase throughout the morning until reaching a midday peak; use drops after 2 p.m. before increasing again. Ridership is highest during the 4 p.m. to 9 p.m. period, accounting for 40% of all checkouts. By comparing the bike share ridership data with daily weather, results showed that users may be more likely to choose bike share mode if weather conditions are favorable. Because of the weather, the system is closed from November until late March.

Based on trips per bicycle per day, Great Rides Bike Share has been very successful, providing as many trips per bike as the largest systems in the country, as shown in Figure 3. Great Rides averaged 6.1 trips per bike per day in 2015 and 4.4 in 2016. During the fall season, trips per bike per day averaged 10.9 in 2015 and 7.4 in 2016. By comparison, New York's Citi Bike, the largest bike share in the United States, averaged about 5.0 trips per bike per day in 2015-2016, and other large systems provided significantly fewer trips.

The success can be attributed to its presence on a college campus, as well as its innovative use of technology that reduced barriers to use. NDSU students are provided a free Great Rides pass as part of their student activity fee, and students can check out bikes using student IDs that they already carry with them. As a result, Great Rides greatly reduced barriers to entry for students. Other factors that could have contributed to success include the city's flat topography and existing bicycle facilities.

A bike share ridership model was developed to predict ridership based on available variables. Results show that temperatures have a quadratic relationship with ridership. Bike share use increases with warmer temperatures, but the impacts of temperature changes on ridership diminish at higher temperatures, and ridership begins to decrease when temperatures exceed 81 degrees. The results also show that precipitation and wind have negative effects on bike share use. The amount of daylight hours in a day was found to have an effect on use of downtown stations but not the stations on campus. Ridership was found to be substantially higher for stations located on campus.

Origin-destination trip analysis showed that about 86% of total bike share trips in 2015 and 90% in 2016 were made between the four stations on the NDSU campus. Figure 4

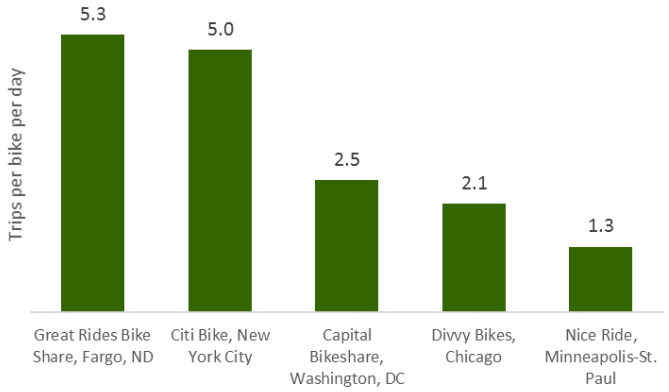

Figure 3. Trips per Bike per Day for Select Bike Share Systems, 2015-2016

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For more details about this study, contact Ranjit Godavarthy at ranjit.godavarthy@ndsu.edu

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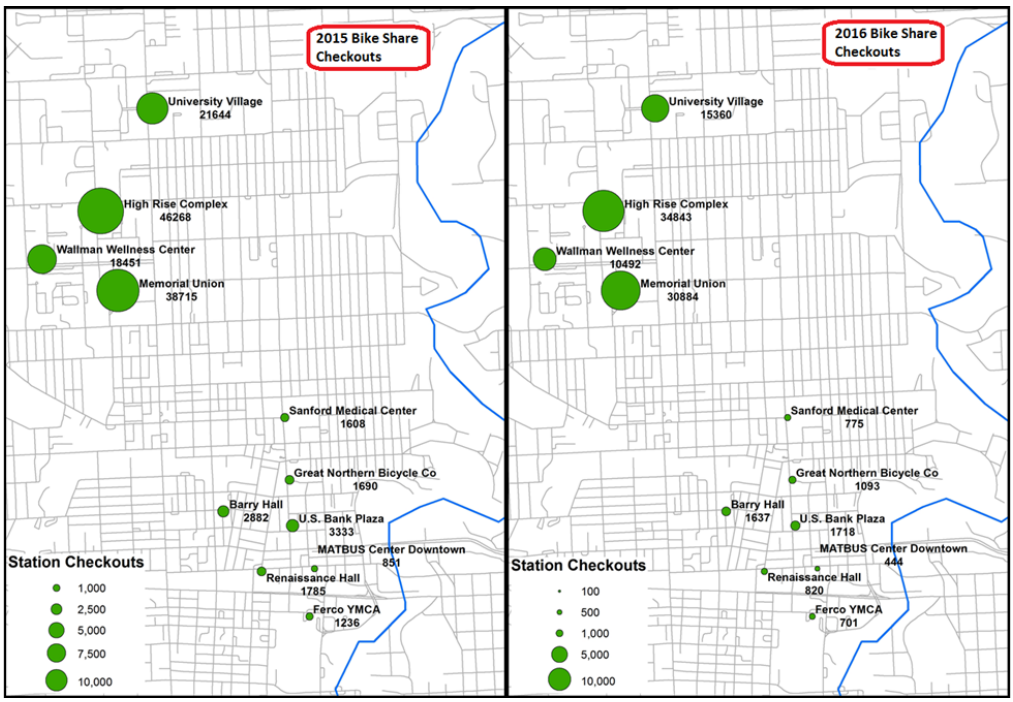

Figure 4. Bike Share Checkouts by Station, 2015-2016

maps the locations of the 11 stations and shows the number of checkouts per station in 2015 and 2016.

Impacts on MATBUS Use

The survey results suggest a possible negative impact on MATBUS ridership following the introduction of the bike share program. However, based solely on the survey data, it is difficult to determine if this effect is real or to estimate its magnitude. Therefore, to better analyze the possible impact on transit ridership, daily MATBUS ridership data for the years 2014-2016 for five routes heavily used by NDSU students were analyzed. The routes studied were those on or near campus and those providing service between downtown and campus.

The data revealed that MATBUS ridership decreased after the introduction of the bike share program. However, a number of factors could have contributed to this decline. In fact, bus ridership decreased throughout the city, including areas without access to the bike share system. A regression model was developed, using daily ridership data, to estimate the impact of bike share use on bus ridership. Results showed that the program did have some negative effect on bus ridership. The study estimates that every 100 bike share trips reduce bus ridership by 0.45% on these five routes, which equates to a loss of 15 bus trips for every 100 bike share trips. However, this explained only a portion of the drop in bus use. The data analysis indicated that other factors played a larger role in the decrease.

Livability Benefits of Great Rides Bike Share Program

Great Rides Bike Share improved livability in Fargo by providing multiple transportation choices and promoting public health with increased bicycling and walking activity. Also, the program provides transportation options that allow users to access a larger coverage area compared to using MATBUS service alone.