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Where Is My Bus? Impact of mobile real-time information on the perceived and actual wait time of transit riders

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ABSTRACT

In order to attract more choice riders, transit service must not only have a high level of service in terms of frequency and travel time but also must be reliable. Although transit agencies continuously work to improve on-time performance, such efforts often come at a substantial cost. One inexpensive way to combat the perception of unreliability from the user perspective is real-time transit information. The OneBusAway transit traveler information system provides real-time next bus countdown information for riders of King County Metro via website, telephone, text-messaging, and smart phone applications. Although previous studies have looked at traveler response to real-time information, few have addressed real-time information via devices other than public display signs. For this study, researchers observed riders arriving at Seattle-area bus stops to measure their wait time while asking a series of questions, including how long they perceived that they had waited.

The study found that for riders without real-time information, perceived wait time is greater than measured wait time. However, riders using real-time information do not perceive their wait time to be longer than their measured wait time. This is substantiated by the typical wait times that riders report. Real-time information users say that their average wait time is 7.5 min versus 9.9 min for those using traditional arrival information, a difference of about 30%. A model to predict the perceived wait time of bus riders was developed, with significant variables that include the measured wait time, an indicator variable for real-time information, an indicator variable for PM peak period, the bus frequency in buses per hour, and a self-reported typical aggravation level. The addition of real-time information decreases the perceived wait time by 0.7 min (about 13%).

A critical finding of the study is that mobile real-time information reduces not only the perceived wait time, but also the actual wait time experienced by customers. Real-time information users in the study wait almost 2 min less than those arriving using traditional schedule information. Mobile real-time information has the ability to improve the experience of transit riders by making the information available to them before they reach the stop.

1. Introduction

It is imperative to improve potential riders' satisfaction with public transportation, because of its societal benefits. Transit provides mobility to those who cannot or prefer not to drive, including access to jobs, education and medical services

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(American Public Transit Association, 2008). Transit reduces congestion, gasoline consumption and the nation's carbon footprint (Davis and Hale, 2007; Schrank and Lomax, 2009). However, from a customer perspective, a mobility choice is only a choice if it is fast, comfortable and reliable. Increasing the competitiveness of non-auto modes is one key to reducing environmental impact (Poudenx, 2008). Transit agencies continuously work to improve transit travel time and on-time performance, but such efforts often come at a substantial cost. One inexpensive way to combat unreliability from the user perspective is real-time transit information. Real-time information can help riders to feel more in control of their trip, including their time spent waiting and their perception of safety. Recent advances in mobile device technology are enhancing opportunities for more productive use of travel time (Lyons and Urry, 2005). Now, the introduction of these more powerful personal mobile devices is also changing the wait time portion of the transit trip as well.

The OneBusAway (OBA) transit traveler information system has existed as a service for transit riders since the summer of 2008 at http://onebusaway.org. The current primary use of OneBusAway is to provide real-time next bus countdown information for riders of King County Metro (KCM) in greater Seattle (Ferris et al., 2009). OneBusAway does this by using the underlying data feed from KCM's Automatic Vehicle Location (AVL) system and the prediction algorithms developed by Dr. Daniel Dailey and others from the Electrical Engineering department at the University of Washington (Maclean and Dailey, 2002). OneBusAway provides a more user-friendly interface to KCM's AVL data by providing multiple means to access the data, including a website, a standard telephone number by which arrival information is read by the computer, an SMS interface for text-messaging, a website optimized for internet-enabled mobile devices, an iPhone application, and an Android application. The OneBusAway interface that has received the most attention to date has been the location-aware native iPhone application (Ferris et al., 2010a), shown in Fig. 1. OneBusAway is being developed as an open-source system to allow other developers to enhance the code in conjunction with the project team, as well as allowing other transit agencies to access the code and use it themselves.

The underlying goal of OneBusAway is to reduce the burden of using public transportation and thereby increase rider satisfaction and increase transit ridership. The results of an online survey of OneBusAway users show preliminary indications of

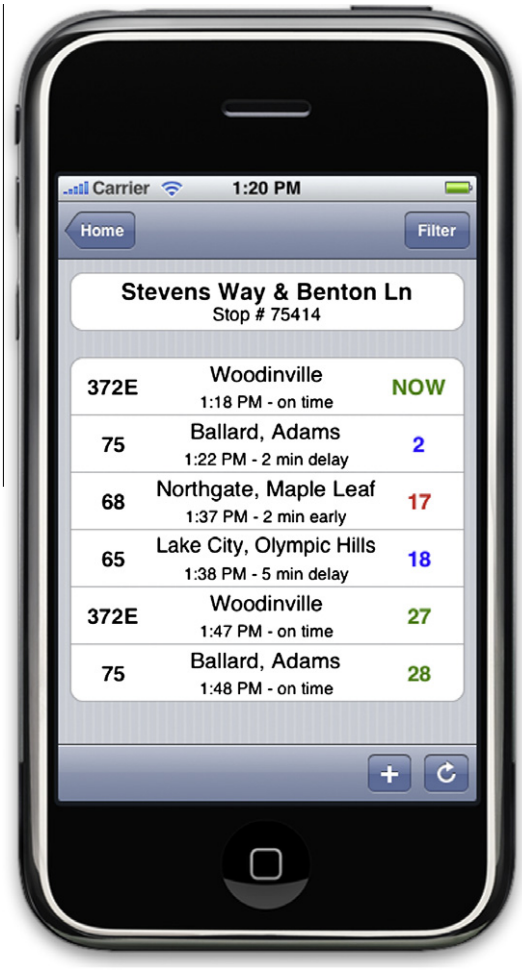

Fig. 1. Example arrival screen for a bus stop from the OneBusAway iPhone application.