Innovation & Research in Transit: Customer Information & Fare Payments

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APTAtech
Columbus, Ohio
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Outline

• My perspective & goals

• Why this matters

• What we know & what we don’t know
  – Part 1: Customer information
  – Part 2: Fare payments

• Summary & what’s next
My perspective

• Assistant Professor
  – City College of New York, 2014-2017
  – University of Tennessee, 2017-now

• My job involves
  – Teaching
  – Research
My research goal

• **Focus:** (Almost) all of my research focuses on new customer-facing transit technologies, particularly *smartphone apps*

• **Goal:** To provide rigorous data-driven, analysis to help answer questions like:
  – Does this technology increase transit customer satisfaction?
  – Does it reduce passenger travel times?
  – Does it increase ridership?
Why this matters (1/2)

Many metropolitan areas are experiencing significant decreases in transit ridership. Transit needs to remain competitive to retain riders.

Image source: APTA’s 2019 Public Transportation Fact Book, page 11
Advancing transit technology is critical to this vision of the future.
What do we know? What don’t we know?

Part 1:
Real-Time Information Apps

Part 2:
Mobile Fare Payment Apps

Image 1: Transit
Image 2: Token Transit
Part 1:

INNOVATION AND RESEARCH IN CUSTOMER INFORMATION
A Brief History of Transit Service Information

Paper Schedules → Digitization → Interactivity

Image Source: Landon Reed
Potential Benefits of Real-Time Info Apps

There are many potential benefits of providing real-time transit information apps to passengers.

- Decreased Wait Times could lead to Increased Satisfaction, which could lead to Increased Ridership.
Benefits of Real-Time Information Apps

Numerous studies provide evidence supporting these passenger benefits.

**Decreased Wait Times**
- Watkins, et al. (2011)
- Brakewood, Barbeau & Watkins (2014)
- Others …

**Increased Satisfaction**
- Gooze, Watkins & Borning (2013)
- Brakewood, Barbeau & Watkins (2014)
- Others …

**Increased Ridership**
- Tang & Thakuriah (2011)
- Tang & Thakuriah (2012)
- Others …
Summary of Real-Time Info Benefits

There are (at least) 28 studies evaluating the benefits of real-time information.

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<th>#</th>
<th>Authors (Year)</th>
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Note: Studies pertaining to "other" miscellaneous benefits are not included in this table.  
● = positive finding; ○ = sometimes positive finding; □ = negative / not significant finding; - = did not consider.

Talking Headways podcast: https://usa.streetsblog.org/2019/06/20/talking-headways-podcast-the-potential-of-real-time-information/ 
New types of information are emerging…

- Crowding information (historical, real-time)
- Customized, real-time service alerts
- Schedule information for flexible transit services
- Integration with shared/micromobility modes

Example: Ridesourcing (Uber/Lyft)

- Anonymized data about Transit app usage provided to select researchers and transit agencies.
- Analyzed user data from 2016, focusing clicks on Uber.
- Major spikes in user’s searching for Uber on:
  1. New Year’s
  2. Winter Storm Jonas (major snowstorm)

- This simple analysis leads to many questions, such as how do app users make the choice between transit and ridesourcing when presented with side-by-side info?

What we don’t know?

- How do these new forms of information impact:
  - Customer satisfaction?
  - Travel behavior (both regular & during irregular events)?
  - Ridership in the short term?
  - Ridership in the long term?
  - Many others …
Part 2

INNOVATION AND RESEARCH IN FARE PAYMENT TECHNOLOGY
A Brief History of Fare Payments

Paper Tickets & Tokens

AFC Systems

Apps (& Bankcards)

Adult Fare
$1.00
Your MTA

One-Way Adult Fare
$1.00
Your MTA

One Ride

Your MTA Card
As of March 2019, there were at least 110 transit operators in the United States with mobile fare payment apps.
There are many potential benefits of providing fare payment apps to passengers.

- Increase transit trips
- Spend less time buying passes; Carry less cash
- Board the transit vehicle faster

Satisfaction
Early Results: Benefits of Mobile Fare Payment Apps

Study of StarMetro bus riders in Tallahassee, Florida.

- 75% of participants reported *spending less time* buying transit passes
- 68% stated that they *carry less cash*
- 64% reported *boarding faster*

Results currently under review. Do not quote or cite. “After” survey of app users with n= 95.
Another Advantage of Fare Payment Apps

- Use the data from mobile fare payment apps for planning purposes
- Study passenger travel patterns (origin-destination flows) using data from a mobile fare payment app
- Compared October 2014 app data to onboard survey

**Onboard Survey Data**

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**Mobile Ticketing Data**

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- Results suggest that app data closely aligns with survey data during peak periods

Note: Screenshot is not the latest version of the app.
Interesting Developments in Mobile Fare Payment Apps

Integration with real-time information apps
Example: St. Catharines

Integration with ridesourcing apps
Example: Denver RTD

Many Questions:
• Does combining real-time information and fare payments increase ridership (more)?
• What are the ridership impacts of Uber integration? Does this facilitate first-last mile trips?
What don’t we know?

• How do mobile fare payment apps impact:
  • Vehicle dwell times?
  • On-time performance?
  • Customer satisfaction?
  • Ridership in the short term? In the long term?
  • Many others …

• What about other forms of mobile fare payment?
  • Bluetooth?
  • NFC?
  • Integration with Google/Apple Pay?
SUMMARY & WHAT'S NEXT
Summary & What’s Next

Part 1: Customer Information
• We know a lot about real-time information
  – Key benefit of real-time information is reduced wait times
• New types of info are increasingly available to transit passengers
  – Examples: vehicle crowding levels, service alerts, many others

Part 2: Fare Payments
• We know less about the benefits of fare payment apps
• Many developments are occurring with fare payments
  – Examples: integration with real-time info apps & ridesourcing, NFC, Bluetooth

What’s next...
• Lots of exciting transit technology topics to discuss this week
  – Examples: vehicle automation, electrification, digital asset management, IoT and many, many others
THANK YOU.

Questions?

Acknowledgements:
There are many people and organizations that I would like to thanks, including:

• University of Tennessee Graduate Students: Abubakr Ziedan, Cassidy Crossland, Antora Haque, Jing Guo
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• City University of New York Collaborators: Niloofar Ghahramani, Dr. Jonathan Peters
• Auburn University Collaborators: Dr. Jeff LaMondia (slide template)
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• NYCEDC Collaborators: James Wong and others
• Token Transit Collaborators
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• And the many transit agencies and operators that have collaborated on research.