Technology to Improve BRT Reliability: Lessons & Challenges

Ricardo Giesen, Director of BRT+ CoE
Department of Transport Engineering & Logistics
Pontificia Universidad Católica de Chile
Giesen@ing.puc.cl
www.BRT.cl
Reliability is key component to satisfy transit users

Technology to increase reliability: Priority & Bus Assist

Experiences in Chile and Sweden

Conclusions y Recommendations
BRT+ CoE was recently renewed until 2021

Members BRT+Centre
Contents

- BRT+ CoE
- **Reliability is key component to satisfy transit users**
- Technology to increase reliability: Priority & *Bus Assist*
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What do we want on BRT or transit services?

- Fast
- Low Waiting Time
- Comfort
- Reliable

- Reduce travel time
- Increase frequency
- Increase capacity
- Reduce variability of travel time
What do we need to get what we want on BRT or transit services?

- **Fast**
  - Reduce travel time
  - Increase speed

- **Low Waiting Time**
  - Increase frequency

- **Comfort**
  - Increase capacity

- **Reliable**
  - Reduce variability of travel time
  - Regular headways

Fast

Low Waiting Time

Comfort

Reliable

REDUCE TRAVEL TIME

INCREASE FREQUENCY

INCREASE CAPACITY

REDUCE VARIABILITY OF TRAVEL TIME

INCREASE FLEET SIZE OR INCREASE SPEED

INCREASE FLEET SIZE, SIZE OF VEHICLES, OR INCREASE SPEED
TODAY MESSAGE

¡INCREASE SPEED & REGULAR HEADWAYS!

Fast
Low Waiting Time
Comfort
Reliable
Let's answer three questions

1. Why bunching occurs?
2. What are the impacts?
3. Is there a solution?
Variability of travel time

Poor dispatching  Congestion  Traffic lights  Drivers Heterogeneity
Variability in *stopping times*

Random arrival of users at each stop
Trajectories time-space
A Service in Santiago, March 25th, 2009

Time (min)
Position (Km)

6:30 AM
8:30 AM
Let's answer three questions

1. Why bunching occurs?
2. What are the impacts?
3. Is there a solution?
BUS BUNCHING
Many Negative Impacts

- Increase of waiting times
- Decrease comfort & reliability
- Increases variability of cycle times
- Reduces transit demand
INCREASE THE SPEED &
REGULAR HEADWAYS!
Let's answer three questions

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You are doing fine

Wait at headers or control points

You are running late

Go slower
Cycle Time

<table>
<thead>
<tr>
<th>Cycle Time (Minutes)</th>
<th>Frequency</th>
</tr>
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<tbody>
<tr>
<td>25</td>
<td></td>
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<tr>
<td>30</td>
<td></td>
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<td>40</td>
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<td>45</td>
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</tbody>
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- **Without Control**
  - Mean = 33.64
  - Std. Dev. = 3.51

- **HRT**
  - Mean = 32.11
  - Std. Dev. = 1.2
The BRT future should be written with double R

**BRRT**
Bus *Rapid* and *Reliable* Transit
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Experiences

Santiago, Chile
Transantiago
Redbus Urbano

Lund, Sweden
Skånetrafiken
Monitoring
Real-time Information

Linear Synoptic
Map Synoptic
Dispatcher
Buses y drivers

Web Plataform
Mobil App
Console on the bus
Communication with driver and regulation (Android)
Smart Dispatcher

Optimization tool, that propose the time and buses for the following departures according to:

- Current location of buses and recent dispatches
- Availability of buses at the header and next arrivals

Main objective to increase indicators of frequency and regularity
Tool for Smart Dispatching at Headers
TRAINING

TEACHING REQUIRED METHODS TO DISPATCH CORRECTLY

THEORETICAL COURSE

PRACTICAL APPLICATION
EXCESS WAITING TIME
At dispatching header

14% REDUCTION
Redbus (Transdev-Chile) Case

Costs: Annual Fines

- 2015: 1,400 millions CL$ (AVERAGE 2015-2016, 26% REDUCTION)
- 2016: 1,200 millions CL$
- 2017: 1,000 millions CL$
- 2018: 800 millions CL$ (AVERAGE 2017-2018)

CL$MM/Month

29

COSTS
Lund Case

Work with government authority of Scania region in Sweden:

• Idiomatic, distance and time barriers
• More technical requirements
• New types of operation (with punctuality or route services with shared segments)
• Focus on design and UX
Conclusions

• Reliability is a key metric in the user experience
• To achieve Reliability we need Regularity
• To guarantee regularity we need:
  ➔ Support of an intelligent system that adapts dynamically to the operating conditions
  ➔ Commitment of drivers and operators
  ➔ KPI and management of continuous improvement