Evaluating Pulse Scheduling in the Strætó Bus System

Kyle France, Suverino Frith, Veronica Melican, and Sam Moran
Strætó bs operates the public bus system of Iceland.
Factors such as traffic and passenger boarding behavior are causing delays in Strætó’s pulse scheduling.
Evaluate the efficiency of pulse scheduling in the context of Strætó's overall public bus system and develop recommendations for the system’s improvement.
Process

Understand **logistics** of how riders make transfers

Understand Strætó employee and rider **perceptions**

Perform **SWOT analysis** to identify benefits and areas for improvement of current system
Interviews with Strætó employees improved our understanding of the problem.

- “And one [bus] is late, and he calls the other bus to wait for him... at the connecting station. And so...all of the buses are getting later also.”
- Fleet Manager
Bus Timeliness

From 2018 to 2019, the percentage of late buses at each station increased.

<table>
<thead>
<tr>
<th>Ártún 2018</th>
<th>Early</th>
<th>On-time</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>15%</td>
<td>73%</td>
<td>12%</td>
</tr>
<tr>
<td>Afternoon</td>
<td>19%</td>
<td>51%</td>
<td>30%</td>
</tr>
<tr>
<td>Midday</td>
<td>23%</td>
<td>68%</td>
<td>9%</td>
</tr>
<tr>
<td>All Times</td>
<td>24%</td>
<td>65%</td>
<td>11%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ártún 2019</th>
<th>Early</th>
<th>On-time</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>10%</td>
<td>72%</td>
<td>19%</td>
</tr>
<tr>
<td>Afternoon</td>
<td>13%</td>
<td>45%</td>
<td>42%</td>
</tr>
<tr>
<td>Midday</td>
<td>18%</td>
<td>65%</td>
<td>18%</td>
</tr>
<tr>
<td>All Times</td>
<td>18%</td>
<td>63%</td>
<td>18%</td>
</tr>
</tbody>
</table>
The largest increase in late buses occurred during the afternoon rush hour.
For most buses at most stations, just two or three routes made up a large majority of transfers made by respondents.
A rider survey revealed perspectives regarding the convenience of transfers at pulse stations.

<table>
<thead>
<tr>
<th>Location</th>
<th>Very Convenient</th>
<th>Somewhat Convenient</th>
<th>Not Very Convenient</th>
<th>Not At All Convenient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ártún</td>
<td>23%</td>
<td>44%</td>
<td>25%</td>
<td>7%</td>
</tr>
<tr>
<td>Mjódd</td>
<td>29%</td>
<td>47%</td>
<td>18%</td>
<td>6%</td>
</tr>
<tr>
<td>Hamraborg</td>
<td>26%</td>
<td>50%</td>
<td>18%</td>
<td>6%</td>
</tr>
</tbody>
</table>
The most common reason: rider’s bus was late.

Reasons Why Riders Find Transfers Inconvenient

- **My bus is late**
  - Árótún: 75
  - Mjódd: 83
  - Hamraborg: 51
- **Other bus is late**
  - Árótún: 14
  - Mjódd: 10
  - Hamraborg: 9
- **Hard to find bus**
  - Árótún: 35
  - Mjódd: 39
  - Hamraborg: 47
- **Long walk between buses**
  - Árótún: 52
  - Mjódd: 35
  - Hamraborg: 35
- **Other**
  - Árótún: 32
  - Mjódd: 30
  - Hamraborg: 17

Reason for Inconvenience
Out of 244 Survey Respondents:

- 27% Said buses are not on time
- 17% Wanted higher frequency
- 16% Experienced negative driver behavior/driving
Strætó should remove pulse scheduling.

Pulses:
- Not always reliable for riders
- Are expensive to operate
- Propagate delays

Removing pulses could:
- Satisfy the rider desire for higher frequency
- Give Strætó improved logistical flexibility
Important considerations

➢ Changes could be made in a less busy time of year
➢ Communication of changes
There are two ways pulses could be removed.

<table>
<thead>
<tr>
<th>All at once</th>
<th>Phased out gradually</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Easy to communicate</td>
<td>● Riders have time to adjust</td>
</tr>
<tr>
<td>● New schedule is immediately consistent</td>
<td>● Initial feedback available</td>
</tr>
<tr>
<td>● Change for riders is sudden</td>
<td>● Changes are more complex to communicate</td>
</tr>
</tbody>
</table>

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Additional recommendations

Improve communication channels with riders
Additional recommendations

Pursue additional priority bus lanes
Additional recommendations

Implement AFC systems on all buses and fully utilize AVL data
Areas for Future Research

Investigate more detailed causes of network delays
Areas for Future Research

Continue to collect data on rider transfers
Thank you!

Special thanks…

To our mentors at Strætó, Ragnheiður Einarsdóttir and Sólrún Skúladóttir

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