VALUE OF TIME FOR BUS PASSENGERS

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The Business Case Development Manual (BCDM) defines the value of time for buses, using generic system wide assumptions on journey purpose split, at £7.55 per hour.

Currently, bus passenger waiting time is valued as 2.5 times the value of in-vehicle journey time.*

The value of waiting time is calculated by multiplying £7.55 by 2.5 (per person/hour).

Hypothesis: Recent technological changes allowing bus passengers to access live waiting time information while waiting for a bus or before arrival at the stop may change (negative) perceptions of waiting time.

- It is also thought that the availability of such information may lead to behavioural change such as delaying departure to stop, changing stop, changing route or mode.

Therefore, research was required to assess whether there is a case for adjusting the wait time multiplier and, if so, by how much.

*Definition of VoT multiplier: Passengers perceive waiting time to be 2.5x greater than riding time – for example, 4 minutes is equivalent to/perceived as 10 minutes on the bus...
Objectives

- TfL wished to understand the impact of ‘live’ bus arrival information on perceived waiting times to ensure the continued accuracy of the multiplier.

There were six key research objectives:

- To understand the impact of live bus arrivals information on passenger’s perception of waiting time.
- To establish the multiplier of bus passenger waiting time ‘at stop’ vs ‘on the bus’.
- To establish passengers perceptions’ of waiting time through the different channels.
- To understand the propensity for passengers changing their behaviour as a result of knowing the bus arrival times in advance.
- To understand if the value of real time information differs in different circumstances.
- To understand what factors influence expectations of average/usual wait time and overall journey time.
Key insights

- Live bus information has a significant impact on bus users’ value of expecting waiting time
  - Overall, current London bus passengers value changes in their ‘at bus stop’ waiting time twice (2x) as much as changes to their in-vehicle time
- Bus customers who check live bus information prior to travelling have lower expected waiting times, especially those on low frequency routes
- The waiting time multiplier varies by; real time information channels available, journey length/purpose and the age of the traveller

- For bus users who check live bus information before their trip:
  - There is no significant difference in the expected waiting time between high and low frequency routes
  - They are also less sensitive to changes in the expected waiting time (at stop) and more sensitive to changes to their in-vehicle time
  - This implies that for a well pre-planned bus journey, passengers value their waiting time the same or even less than their in-vehicle time.
Main Findings
Expectations of wait times at stop slightly shorter than actual wait times

- Expectation of wait time was slightly shorter than actual wait time
  - Expectation of wait time was slightly shorter than actual wait time
  - Those who did not use live bus arrival times had longer expected wait times than those who did: 6 minutes on average compared to 5.1 minutes

- Those who checked live bus times had shorter expected and actual wait times than those who didn’t

<table>
<thead>
<tr>
<th>Expectation before arrival</th>
<th>Actual wait time</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2 minutes</td>
<td>21</td>
</tr>
<tr>
<td>3 to 5 minutes</td>
<td>54</td>
</tr>
<tr>
<td>6 to 10 minutes</td>
<td>20</td>
</tr>
<tr>
<td>11 to 15 minutes</td>
<td>3</td>
</tr>
<tr>
<td>Over 15 minutes</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>expectation before arrival</th>
<th>actual wait time</th>
</tr>
</thead>
<tbody>
<tr>
<td>checked live bus info before arrival</td>
<td>4.5</td>
</tr>
<tr>
<td>did not check live bus arrival info before arrival</td>
<td>5.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>expectation before arrival</th>
<th>actual wait time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base: 565</td>
<td>6.3</td>
</tr>
<tr>
<td>Base: 296</td>
<td>7.0</td>
</tr>
</tbody>
</table>

Base: 1,421
Customers checking live bus information have reduced/similar expected wait times for low and high frequency routes

- Bus users on low frequency routes have a slightly longer expected waiting time compared to those on the high frequency routes (as would be expected)

- However, this difference varies across the different information provision groups
  - Those with no access to live information or who don’t check live information have longer expected waiting times for low frequency services
  - Those who check live bus information have similar expected wait times for low and high frequency routes
Current bus customers value changes in their waiting time 2 times* more than changes to their in-vehicle time – reduced by use of real time information

- Overall, current London bus customers value changes in their waiting time 2 times* more than changes in their in-vehicle time.
- This takes account of the emerging impact of real time information which lowers the average multiplier values.
- Bus users who checked live bus information prior to making their journey had a lower multiplier.
- A reduced multiplier of 2 is recommended.

<table>
<thead>
<tr>
<th>Sample %</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haven't checked or no access to information</td>
<td>61</td>
</tr>
<tr>
<td>Checked waiting time using Mobile</td>
<td>32</td>
</tr>
<tr>
<td>Checked waiting time using Internet</td>
<td>4</td>
</tr>
<tr>
<td>Checked waiting time using both Mobile and Internet</td>
<td>2</td>
</tr>
<tr>
<td>Overall</td>
<td>100</td>
</tr>
</tbody>
</table>

*This multiplier is smaller than the currently recommended value by DfT (WebTAG of 2.5 for commuting and other purposes)
How the VoT Multiplier works...

- **Current VoT multiplier = ‘2.5’**
  - Expected waiting time = 4 minutes
  - Actual waiting time = 4 minutes
  - Equivalent riding time = 10 minutes

- **Potential new VoT multiplier = ‘2’**
  - Expected waiting time = 4 minutes
  - Actual waiting time = 4 minutes
  - *Real time bus information*
  - Equivalent riding time <= 8 minutes
2 in 3 customers use live bus information

- 61% got live bus information

- Those who didn’t typically just turned up

- Two thirds who got live bus information checked it before arrival at the stop

- I didn’t, I just turned up: 53
- I know the bus is frequent so I just turned up: 31
- I know when the bus is due to arrive: 12
- Other: 4

Base: 560

Base: 1,421

Base: 861

Did not check: 34%
Checked: 66%
A balance between ‘at home’ and ‘on street’ checking of live bus information

- The 66% who checked the live bus arrival information before arrival at the stop did so mostly at home or on street:
  - 53% at home
  - 46% on street
Live bus information has an impact on customer behaviour

- 56% of those who checked live bus arrival information before arriving at the bus stop changed their behaviour based on that information:
  - 39% leave later than they would have
  - 14% used another bus route
  - 13% went to a different bus stop

Bar chart:
- No: 44
- Leave later than you would have: 39
- Use another bus route: 14
- Go to a different stop: 13
- Use another means of travel: 8

Base: 565
Perceptions of accuracy of information are high

- The 56% who checked live bus information **before** arrival were asked how accurate they thought the information was:
  - Over three quarters said it was spot on or 1-2 minutes out
  - However, 9% said it was 5 minutes or more out

- 44% of people interviewed claimed the stop had a Countdown sign present*
  - 9 in 10 used Countdown at stops where it is present (i.e. to check arrival times)

*There are actually 19,000 bus stops – of which 2,500 have a Countdown sign (the sample quota was not set by Countdown for this project)
At stop slightly less productive than on bus – smart phone is main activity used

- **At stop**
  - Using smart phone is main activity
  - Little variation by time at stop

![Bar chart showing activities at stops](chart1)

- **On bus**
  - Using smart phone is main activity
  - The longer the journey the more activities

![Bar chart showing activities on bus](chart2)

Average number of activities = 1.8

Base: 1,421

Average number of activities = 1.8

Base: 1,421
Time on the bus much more enjoyable & productive than at the stop

- Time on bus much more enjoyable and productive than time at stop:
  - Those who didn’t use live bus information found time at stop more enjoyable & more productive

- Those at Countdown stops found time more enjoyable than those at non Countdown stops

Base: 1,421
Policy implications and recommendations

- Live bus info can improve the bus users’ experience by changing how long they have to wait, particularly for those on low frequency routes
  - When evaluating the benefit of live bus information, the impact on waiting times should be considered
- We recommend using a bus wait time multiplier of 2.0 - lower than the current DfT WebTAG recommended value (of 2.5)
- Access to live bus information acts to reduce the multiplier so over time we would expect the average multiplier to be reduced further
- When appraising future London bus schemes it will be important to take into account the lower penalties now being placed by some groups on bus waiting times
- In the short term, it would be possible to adjust the overall multiplier by changing the proportions of bus users checking waiting times in advance.
Appendices
Methodology/sampling

- Two sampling methods:
  - **Oystercard Database:**
    - TfL Oystercard Database sampled
    - Those who used a bus at least twice in last 8 weeks
    - 20,000 invites = 1,006 online completes
  - **At stop recruitment:**
    - Intercept CAPI survey using Android tablets
    - 1 in n random sampling approach
    - 1,397 recruited = 415 interviews
    - Quotas on; journey purpose, access to stop, age and gender
    - Participants invited to undertake a follow-up survey on-line or by phone (£5 incentive offered)
    - Bus stops locations chosen to represent a range of types covering Countdown, frequency, geography
    - Fieldwork between 12th and 29th March 2016
    - 1,397 recruitment interviews:
      - 1,156 emails = 318 online completes
      - 241 by phone = 97 CATI interviews
    - Total interviews = **1,421**
Sample, Pilot and Weighting

- **Online**
  - 1,324 online completes:
    - 318 from at stop recruitment (28% response rate)
    - 1,006 TfL sample (5% response rate)
  - The average questionnaire length was 13.5 minutes to completion

- **CATI**
  - 97 interviews completed from 241 tel. numbers (40% response rate)
  - The average interview length (by phone) was 17 minutes

- **Total completed interviews = 1,421**

- **Pilot**
  - A pilot was undertaken in Jan/Feb 2016 to test the method, questionnaire and stated preference

- **Weighting**
  - Data was weighted to the Bus User Survey 2014 by:
    - age, gender and journey purpose
Just over half waited as long as they expected (53%) actually waited about as long as they expected to wait at the stop:
- 27% waited longer and 20% waited shorter than expected

<table>
<thead>
<tr>
<th>Expected wait time</th>
<th>0 to 2 minutes</th>
<th>3 to 5 minutes</th>
<th>6 to 10 minutes</th>
<th>11 to 15 minutes</th>
<th>Over 15 minutes</th>
<th>base</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2 minutes</td>
<td>12</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>299</td>
</tr>
<tr>
<td>3 to 5 minutes</td>
<td>10</td>
<td>29</td>
<td>10</td>
<td>2</td>
<td>1</td>
<td>740</td>
</tr>
<tr>
<td>6 to 10 minutes</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>310</td>
</tr>
<tr>
<td>11 to 15 minutes</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>47</td>
</tr>
<tr>
<td>Over 15 minutes</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>Base</td>
<td>348</td>
<td>582</td>
<td>331</td>
<td>90</td>
<td>70</td>
<td></td>
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</tbody>
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