Melbourne Buses, Performance, Progress and Futures

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Introduction

Performance

Progress

Futures
This paper looks at Melbourne bus performance, progress and futures.
Introduction

Performance

Progress

Futures
Buses ARE Melbourne’s public transport for most residents, which is a problem....

- Over two thirds of Melbourne can only be serviced by bus services since rail and tram services lie considerable distances from where people live or where they want to travel to.

- In 1996 the Metropolitan strategy team identified that 2.16M Melbournians lived in areas where buses were the only means of access to public transport. 0.98M lived within access distance of rail services.
...because there aren't many

- Over two thirds of Melbourne can only be serviced by bus services since rail and tram services lie considerable distances from where people live or where they want to travel to.
- In 1996 the Metropolitan strategy team identified that 2.16M Melbournians lived in areas where buses were the only means of access to public transport. 0.98M

<table>
<thead>
<tr>
<th>Weekday Service Frequency (2006)</th>
<th>Weekday Service Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak</td>
<td>Off Peak</td>
</tr>
<tr>
<td>AV. MELBOURNE</td>
<td>40m</td>
</tr>
</tbody>
</table>
The bus network on weekdays...

Source: Currie (2003)
...contrasts somewhat with weekends

Source: Currie (2003)
Frequency drives Australian ridership performance

In general our bus service level is poor compared to world practice.

So what do passengers think about these issues?
Variation in Perceptions of Urban Public Transport Performance Between International Cities Using Spiral Plot Analysis

# Bus Passenger Opinions on Bus Improvement Priorities

<table>
<thead>
<tr>
<th>Improvement Options</th>
<th>Individual Score</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reliability</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buses arriving and departing on time</td>
<td>6.22</td>
<td>6.16</td>
</tr>
<tr>
<td>Buses connecting well with other transport services</td>
<td>6.10</td>
<td></td>
</tr>
<tr>
<td><strong>Temporal Service Coverage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekend services provided</td>
<td>5.93</td>
<td>5.71</td>
</tr>
<tr>
<td>Buses operating until late at night on weekends</td>
<td>5.49</td>
<td></td>
</tr>
<tr>
<td>Buses running more often in peak hours</td>
<td>5.23</td>
<td>5.23</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved bus service information at stops</td>
<td>5.27</td>
<td>4.90</td>
</tr>
<tr>
<td>Customer information buttons at stops</td>
<td>4.52</td>
<td></td>
</tr>
<tr>
<td><strong>Information</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safer pedestrian crossings at bus stops</td>
<td>4.85</td>
<td>4.64</td>
</tr>
<tr>
<td>Lighting and video surveillance at bus stops</td>
<td>4.43</td>
<td></td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved shelter and seating at stops</td>
<td>5.06</td>
<td>4.55</td>
</tr>
<tr>
<td>Making it easier to get on and off buses</td>
<td>4.04</td>
<td></td>
</tr>
<tr>
<td><strong>Comfort</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus trips take less time</td>
<td>4.11</td>
<td>4.11</td>
</tr>
<tr>
<td><strong>Speed/TT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus services operating closer to home</td>
<td>4.14</td>
<td>3.71</td>
</tr>
<tr>
<td><strong>Spatial Service Coverage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buses operating to new destinations</td>
<td>3.27</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Scores range from 1 to 7  
**Source:** Smart Bus project. Passenger and local community research (YCHM, Nov. 1999)
Introduction

Performance

Progress

Futures
Since 2001 PT service increased 63% (66% bus/ 36% rail, 10% tram) but - but population growth continues at a faster pace...

Source: Department of Transport/ Public Transport Victoria Annual Reports
Since 2001 PT service increased 67% (70% bus/ 37% rail, 11% tram) but - but population growth continues at a faster pace...

**Index of Public Transport Service Kms p.a (2001-2=100)**

**Population Growth (M)**

Source: Department of Transport/ Public Transport Victoria Annual Reports

Note: * More bus services sooner initiative (~$2.5M 2016-2020); New bus services initiative ($3M-$9Mp.a. 2015-2020)
in last 10 years, per person service increased 22% then declined since 2011 (we have declined by 9% points); recent trend is flat

Relative Service Level Per Head

Service Levels (Vkms supplied) Per Capita

Year

Source: Department of Transport/ Public Transport Victoria Annual Reports
in last 10 years, per person service increased 21% then declined since 2011 (we have declined by 12% points); recent trend is decline.

Source: Department of Transport/ Public Transport Victoria Annual Reports
Melbourne has BIG inequity in PT service—many high need areas with no service areas on the urban fringe; bus is a big part of this

Service Supplied by Population


Service Supplied (Green) – Highest Social Need Areas (Red)

In 2016, 18 of our 30 LGA’s have below average service per resident...

Cardinia, Mornington & Melton have lowest service/head; Melbourne, Yarra, Manningham and Maribyrnong, the highest

Change in service is also uneven; some decline occurred 2015-2016...

Notably in Casey, Banyule, Nillumbik and Monash.

PUBLIC TRANSPORT SERVICE LEVEL TRENDS IN LOCAL GOVERNMENT AREAS IN MELBOURNE

Objectives

- To measure the quantity of urban public transport provision in local government areas in Melbourne between 2015 and 2016
- To explore if and how urban public transport provision has kept pace with population growth.

Method

- Compilation of public transport vehicle kilometres and urban population data for local government areas in Melbourne by year
- Comparison of public transport vehicle kilometres per capita by year.

Key results

CHANGES IN PUBLIC TRANSPORT SERVICE LEVELS PER CAPITA ARE HIGHLY UNEVEN ACROSS MELBOURNE.

Fig. 1 Public transport service provision per capita by local government area in Melbourne, 2016 (Total weekly public transport vehicle kilometres per 1,000 people)
Objectives

- To measure aggregate urban public transport provision in Melbourne from 2001-02 to 2016-17
- To explore if and how urban public transport provision has kept pace with population growth.

Method

- Compilation of public transport vehicle kilometres (by mode) and urban population data for Melbourne by year
- Comparison of public transport vehicle kilometres per capita by year.

Key results

PUBLIC TRANSPORT SERVICE PROVISION PER CAPITA HAS BEEN DECLINING SINCE 2011-12 IN MELBOURNE.

Fig. 1 Public transport timetabled kilometres per year by mode in Melbourne (indexed: 2001-02 = 100)

Fig. 2 Public transport timetabled kilometres per capita per year in Melbourne
Introduction

Performance

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Futures
Bus Ridership Growth...we did a world review of methods of substantially increasing bus ridership - here are the findings

Issues Covered

• Behavioural studies (elasticity of demand)
• Bus Improvement Experience
• International Expert Delphi Study

Behavioural evidence identifies a rank for improvement measures based on maximum possible impact

- Rank based on higher patronage growth impacts:
  1. Service Level Improvement (200% plus)
  2. Free fares (<=40%)
  3. Reliability (<20%)
  4. Travel Time (<15%)
  5. BRT (alone) (<10%)
  6. Soft Factors (<2-5 %)

Bus improvement experience (Australia) suggests major BRT revisions, network restructuring and free CBD services (tram in Melbourne)

- Ranking of measures based on patronage impacts:
  
  1. Bus Rapid Transit Systems (market growth in the order of 20% - 70% at a corridor level)
  2. (Free) CBD Distributors (market growth around 50% - 200% affecting CBDs)
  3. Bus Network Area Restructuring (network-wide market growth around 10-30%)
  4. Express Bus (market growth around 15% - 30% but only affecting route catchments)
  5. Increased Frequencies/Minibus (market growth 10% - 40% at mainly a route level)
  6. Bus Priority Measures (10% - 50% at a route group/corridor level)
  7. Bus Marketing/Passenger Information, including TravelSmart (up to 20% at an area level).

A UK study (TAS) identified network simplicity as THE most cost effective pax growth measure

![Figure 1: Cost Effectiveness of Bus Improvements – UK](source)

The EU Jupiter project identified priorities in terms of effectiveness and cost effectiveness.

<table>
<thead>
<tr>
<th>JUPITER Rank for Highest Patronage Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Service reliability based measures (busways, bus lanes, junction priority)</td>
</tr>
<tr>
<td>2. Frequency of service</td>
</tr>
<tr>
<td>3. Passenger information based measures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUPITER Rank for Highest Cost Effective Patronage Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Low floor buses</td>
</tr>
<tr>
<td>2. Bus priority at traffic signals</td>
</tr>
<tr>
<td>3. New interchanges replacing inadequate facilities; and</td>
</tr>
<tr>
<td>4. Real time passenger information.</td>
</tr>
</tbody>
</table>

The research identified many commonalities between alternative avenues of investigation.

### Synthesis of Factors to Effectively Grow Bus Markets

#### Behavioral Evidence

1. Service Level Improvement (200% plus at low service level)
2. Free fares (<=40%)
3. Reliability (<20%) (where reliability poor)
4. Travel Time (<15%)
5. Intrinsic BRT factors (<10%)
6. Soft Factors (<2% - as a package <=10%)

#### International Expert Survey

1. Service Level Increases (frequencies)
2. Bus reliability Factors (like BRT ROW)
3. Spatial coverage

**Best Practice Systems**

BRT systems due to high service level, reliability/ROW segregation, simple marketing image

#### Bus Improvement Experience

- **Australia/Elsewhere**
  - Bus Rapid Transit Systems
  - Increased Service Levels
  - Bus Priority
  - CBD Free Bus Systems

#### Cost Effectiveness

1. Service Simplification
2. Promotion/Branding
3. New Low Floor Buses
4. Bus traffic signal priority
5. Real time information systems

So what do I think we should do with buses?
We have to invest; not to keep up, but to EXCEED growth…

Index of Public Transport Service Kms p.a (2001-2=100)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rail</th>
<th>Tram</th>
<th>Bus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-2</td>
<td>100</td>
<td>110</td>
<td>120</td>
<td>130</td>
</tr>
<tr>
<td>2002-3</td>
<td>140</td>
<td>150</td>
<td>160</td>
<td>170</td>
</tr>
<tr>
<td>2003-4</td>
<td>3.6</td>
<td>3.6</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>2004-5</td>
<td>3.7</td>
<td>3.8</td>
<td>3.8</td>
<td>3.8</td>
</tr>
<tr>
<td>2005-6</td>
<td>3.8</td>
<td>3.9</td>
<td>4.0</td>
<td>4.1</td>
</tr>
<tr>
<td>2006-7</td>
<td>4.2</td>
<td>4.3</td>
<td>4.4</td>
<td>4.5</td>
</tr>
<tr>
<td>2007-8</td>
<td>4.6</td>
<td>4.7</td>
<td>4.8</td>
<td>4.9</td>
</tr>
<tr>
<td>2008-9</td>
<td>5.0</td>
<td>5.1</td>
<td>5.2</td>
<td>5.3</td>
</tr>
</tbody>
</table>

Population Growth (M)

Source: Department of Transport/ Public Transport Victoria Annual Reports
...we need to stop going backwards and go FORWARDS per capita

Source: Department of Transport/ Public Transport Victoria Annual Reports
On balance Mass Transit is Effective; Social Transit is Weak and hard to justify

<table>
<thead>
<tr>
<th></th>
<th>Mass transit</th>
<th>Social transit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network characteristics</strong></td>
<td>Direct service; long stop spacing; low density</td>
<td>Circuitous service; short stop spacing; high density</td>
</tr>
<tr>
<td><strong>Operational characteristics</strong></td>
<td>Frequent, long spans</td>
<td>Infrequent, short spans</td>
</tr>
<tr>
<td><strong>Ridership</strong></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Societal benefits</strong></td>
<td>Reduced congestion, agglomeration benefits, economic benefits</td>
<td>Increased social inclusion, environmental justice</td>
</tr>
<tr>
<td><strong>Customer type</strong></td>
<td>Choice</td>
<td>Captive</td>
</tr>
<tr>
<td><strong>Typical demographics</strong></td>
<td>Employed persons, younger age groups</td>
<td>Unemployed, retired, very young and very old, ethnic minorities</td>
</tr>
</tbody>
</table>
I favour Route Concentration over Social Transit and seeking new 1st/Last Mile solutions (including longer walk access)

**Social Transit (is Dead)**

High density/ low frequency vs. High frequency/ low density

+ area coverage
- frequency
\( \frac{1}{2} \) waiting time, reliability

+ frequency
- area coverage
\( \frac{1}{2} \) first/ last mile problem

Source: Graphics from the SEPT-GRIP PhD Research of Nora Estfaller
e.g. strong uptake route 798 Cranbourne/ Selandra Rise

- Connects to Cranbourne train station and shopping centre
- Runs every 20-30 minutes
- Good service span
  - 5:30 – 22:30 weekdays
  - 6:30 – 24:00 Saturday
  - 7:00 – 21:30 Sunday

Long Walk Access Distance to a quality frequency

Uber/Lift is a bus problem but also (with car/bike share) a possible 1st/Last Mile solution (but this might be wishful thinking)

Uber/Lyft Impact on PT in USA

- net change 6% reduction
- net increase for rail (+3%)
- net decline for bus (-6%) and light rail (-3%).

We need more (and better resourced) SmartBus

**Tram**
- Streetcar/Light Rail
- 23 routes/ 500 cars
- High frequency; 7.5 min headway
- Short Routes; Round Trip Time = 110 mins

**SmartBus**
- 8 routes
- 200 buses
- Low frequency; 15 min headway
- Long Routes; Round Trip Time = 238 mins
For DART; its time to talk city bus tunnels like Brisbane (perhaps part of future rail/Metro 2?)
Bus Rapid Transit (Rubber Tired Rail) or LRT should be part of the plan including urban densification as part of project...
Bus Rapid Transit; Rubber Tired Railways; cost effective but not as good?
There may be new ways to bring the Train to the City
CONNECTING CITIES

PTRG is the name for researchers at Monash University who are engaged in research on public transport systems, users, planning and policy.
Join the **ITS (Monash)** LinkedIn group to keep informed of our activities.