Public bikes in Barcelona

Carles Romero
Mobility Department
Barcelona: Mobility basic information

Barcelona is a city with a high demographic density, with 1.600.000 inhabitants in 101 km² (density: 15.963 inhabitants/km²).

Barcelona is the center of one of the biggest metropolitan areas in Europe: the Metropolitan Region of Barcelona that integrate 164 municipalities and 4.4 millions of inhabitants. (density: 1.359 inhabitants/km²).
The non-motorized modes of transport (51.5%) and the public transport (32.7%) are the most used on internal displacements.

In the connection displacements, the public transport (49.5%) and the private transport (47.5%) have very similar proportions of use.
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Barcelona: GLOBAL BICYCLE PROMOTION

- 28 km of new cycle lanes
- More bicycle parking places (from 14,000 to 25,000)
- Improved safety for existing cycle lanes
- More 30 Zones (car-bicycle co-existence)
Beginning on March 2007

- 6000 bicycles
- 400 stations
- Coverage 49 km²
- Coverage Range 197 m
- Slope < 4%
TPI contracting-financing forms

1. Using a service rendering contract:
   Barcelona, Brussels, Sidney ... models

The public bicycle service system is an open request for tenders as a providing of a public service. The administration have a direct control all over the system.

2. Included on the advertising contracts:
   Oslo, Lyon, Paris ... models

The public bicycle system is integrated in the advertising contract, as a part of the canon. The control mechanism is subject to the principal aim of the advertising contract.
Bicing is financed with the excess of the integral regulation parking system, the “Àrea Verda”, in accordance with the Fiscal Orderly establishes.

Object: Safe, Sustainable, Equitable, Efficient Mobility

Car use restriction instruments: Parking Integral Regulation

More sustainable modes promotion: Project
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2 years later...
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On May 2009:
- 187,375 joins.
- 6,000 bicycles.
- 400 stations.

Customers number evolution (Annual subscription)

<table>
<thead>
<tr>
<th>Bicycles:</th>
<th>300</th>
<th>1,500</th>
<th>3,000</th>
<th>4,500</th>
<th>6,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abonados</td>
<td>6 €</td>
<td>72,720</td>
<td>90,477</td>
<td>101,875</td>
<td>129,749</td>
</tr>
<tr>
<td>Bajas</td>
<td></td>
<td></td>
<td></td>
<td>130,167</td>
<td>149,055</td>
</tr>
<tr>
<td>Altas</td>
<td></td>
<td></td>
<td></td>
<td>154,111</td>
<td>172,162</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>6 €</th>
<th>24 €</th>
<th>30 €</th>
</tr>
</thead>
<tbody>
<tr>
<td>364</td>
<td>418</td>
<td>5,056</td>
<td>7,851</td>
</tr>
</tbody>
</table>

Ajuntament de Barcelona
Prevenció, Seguretat i Mobilitat
## Customers description

<table>
<thead>
<tr>
<th>PROFESSION</th>
<th>% CUSTOMERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>15.86%</td>
</tr>
<tr>
<td>Administrative</td>
<td>9.38%</td>
</tr>
<tr>
<td>Engineer</td>
<td>7.12%</td>
</tr>
<tr>
<td>Civil Service</td>
<td>4.86%</td>
</tr>
<tr>
<td>Self-employed</td>
<td>4.12%</td>
</tr>
<tr>
<td>Artist</td>
<td>3.69%</td>
</tr>
<tr>
<td>Teacher</td>
<td>3.22%</td>
</tr>
<tr>
<td>Economist</td>
<td>3.12%</td>
</tr>
<tr>
<td>Arquitect and quantity surveyor</td>
<td>2.48%</td>
</tr>
<tr>
<td>Manager / Director</td>
<td>2.26%</td>
</tr>
</tbody>
</table>

- Change in the bicycle customer role
- 59% of customers are older than 30 years old.
- Professional diversification

**Before bicing:**
Mainly users are young students involved with sustainability and environment.

**After bicing:**
Professional diversification and increase of the bicycle customer average age. Use due to comfort and speed.
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Use characteristics

**Bicing Displacements Reasons**

- 68.2% are obligated mobility journeys (work, studies, etc.)
- Bicing has assumed the role of an usual urban transport mode for all displacement reasons.

**Intermodality**

- 63% are realized exclusively with Bicing
- 37% combines Bicing with other transport modes
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Journey features

Journey features with BICING

<table>
<thead>
<tr>
<th>Journey</th>
<th>Average length</th>
<th>Working days: 14.1 minutes</th>
<th>Holidays: 17.8 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>3 km</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Rush Hour
Example: Zona universitaria

Displacements / day type | Summer (June) | Winter (January) |
---|------------------|------------------|
Working day | 47,069 | 34,150 |
Holiday | 32,127 | 19,244 |

Every day 97,139 bicycle displacements take place in Barcelona

48.45% of bicycle journeys during a favourable climate working day by BICING
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Importance and Evaluation

**Stations location (coverage)** have a high valuation

The two points considered the most important (availability) are less valued

Studies for improve:
- **System compensation** (Bicycles / Anchorages≈2)
- **Distribution logistics**
Reflections about the implementation and management of the Barcelona Bicycle Public Service
Investment and recovery costs

The estimated global inversion global for Bicing services is 15.9 million euro, emphasizing the stations cost that represents almost the 70% and, in the distance, the bicycles cost (17%).

INVESTMENTS DISTRIBUTION

- 17% Bicycles
- 69% Stations
- 5% Control and management
- 5% Information
- 5% Maintenance and repair
- 17% Bicycles movement
- 69% Administration and structure
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SERVICE COST

Running costs

Personnel cost
Bicing service staff are about 230 people, 50% of them are assigned to bicycles movement.

The estimated personnel cost is about 5 million euro.

Service costs

Estimated global service costs: **10,2 million €/year**
SERVICE COST

Cost coverage

Users income:
Users contribution as an income concept will be around 4,5 million euro. On 2008, 90% of them corresponds to annual subscriptions, and will be between 6,5 and 7,8 million on year 2009 depending on the customers number evolution, in accordance with new fares approved for this period.

Service collection coverage, with the actual price system, will be around 33% of running expenses and joint recoveries (44% of expenses exclusively).

ESTIMATED INCOME COVERAGE

- About expenses
- About expenses + recoveries
EVALUATION OF SERVICES PROVIDED

Availability of execute displacements on slope

A quarter of users assert that they **always** make Bicing trips on slope. 40% of users are not used to make slope routes.

**AVAILABILITY OF EXECUTE DISPLACEMENTS ON SLOPE**

<table>
<thead>
<tr>
<th>Location</th>
<th>Never</th>
<th>Some times</th>
<th>Many times</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>7%</td>
<td>35%</td>
<td>32%</td>
<td>27%</td>
</tr>
<tr>
<td>Sant Andreu</td>
<td>8%</td>
<td>8%</td>
<td>29%</td>
<td>32%</td>
</tr>
<tr>
<td>Gràcia</td>
<td>4%</td>
<td>3%</td>
<td>35%</td>
<td>29%</td>
</tr>
<tr>
<td>Les Corts</td>
<td>3%</td>
<td>3%</td>
<td>35%</td>
<td>29%</td>
</tr>
<tr>
<td>Eixample</td>
<td>7%</td>
<td>3%</td>
<td>36%</td>
<td>19%</td>
</tr>
<tr>
<td>Ciutat Vella</td>
<td>6%</td>
<td>5%</td>
<td>30%</td>
<td>26%</td>
</tr>
<tr>
<td>Zona Port</td>
<td>11%</td>
<td>3%</td>
<td>31%</td>
<td>26%</td>
</tr>
</tbody>
</table>

% users

Font: Estudi d'hàbits dels usuaris del Bicing. 2008
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DISTRICTS RELATION. TRIPS / TOTAL WORKING DAY

180
13.7%

52
22.4%

621
44.9%

240
19.5%

7,101
48.6%

3,567
32.2%

3,56
19.5%

1,0
0.4%

2,7
19.5%

19
4.3%

4,3
9.4%

50
1.9%

2,5
0.9%
EVALUATION OF SERVICES PROVIDED

DAILY ASYMMETRY PER STATION DURING A WORKING DAY

Asymmetry ($\alpha$) is represented as the relation between generated trips (G) and attracted trips (A):

$$\alpha = \frac{G}{A}$$

49% of stations have a balanced asymmetric rate.

Each circle diameter indicate the volume of generated trips, whereas the colour represent the $\alpha$ value.
EVALUATION OF SERVICES PROVIDED

Blue circles represent the empty stations during the day, the red ones represent the completely full stations and its diameter represents the number of hours that have been full.
EVALUATION OF SERVICES PROVIDED

RUNNING CONDITIONS
FUNCTIONAL ASSOCIATION OF STATIONS BY ASYMMETRY AND CENTRALITY
IMPROVEMENT MEASURES

Studies execution:

• Studies about **mobility**:
  • Demand analysis:
    • Origin/destiny matrix
    • Self control by neighbourhood and zones
    • Schedule distribution
    • Stations imbalance
  • Supply analysis:
    • Territorial coverage
    • Agility of the system
  • **Search of alternatives for demand management, and improve/adapt the supply**

• Studies about **operative optimization**:
  • Analysis: problems detection
  • System resizing
    • Stations, slots, bicycles, redistribution systems, etc.
IMPROVEMENT MEASURES

Improvement proposal:

Most saturated and/or unbalanced zones boost:

• **Short term** measures
  • Suggest to Clear Channel a *replacement route reorganization* by zones, to give an homogeneous service to unattended zones with minimum costs
  • **Densification of clusters** at zones where the storage capacity is insufficient, extending the current stations when is possible, or opening new stations near to the existing ones
  • At new programmed stations (Sants), preferably stations with 60 slots (2x30)

• **Long term** measures
  • Periodic revision of the clusters zoning, the stock planning, and the van assignment, as the demand increase
  • Use of a station stock control tool, for visits reassignment

<table>
<thead>
<tr>
<th>Station Code</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL027</td>
<td>PLAÇA CATALUNYA</td>
</tr>
<tr>
<td>CL029</td>
<td>BARCELONETA</td>
</tr>
<tr>
<td>CL030</td>
<td>HOSPITAL DEL MAR</td>
</tr>
<tr>
<td>CL032</td>
<td>VILA OÍMPICA</td>
</tr>
<tr>
<td>CL034</td>
<td>UPF</td>
</tr>
</tbody>
</table>
IMPROVEMENT MEASURES

Improvement proposal:

• Solve of redistribution problems:
  • Access problems to some stations
  • Action protocol
    • Security improvement
    • Minimize the traffic affectation

• Revision of the service levels requirements (contract conditions).

• Improve on demand management:
  • Incentive for customers → Auto-balance of the system
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