BRT PERFORMANCES vs. MRT
Content

– Identification of 2 types of BRT

– BRT cases: success, limits and future
  • CURITIBA
  • BOGOTA

– BRT Limits of capacity
  • Modeling - Theoretical example
  • Comparison BRT / MRT

– Conclusion
2 TYPES OF BRT

High capacity BRT

- Success of BOGOTA and CURITIBA
- High capacity similar to MRT
  - Large right of way: 2x2 or 2x1 lanes
  - Hierarchy of PT network (BRT + feeders)
  - High quality of service
  - Different services (Express, Direct, Normal)
  - Modern buses
  - Adapted stations (ticketing on stations)
  - 2 to 3 modules per station
  - ITS
2 TYPES OF BRT

Urban BRT (2*1 lane)

- Huge success in Europe and mainly in FRANCE (Bus à Haut Niveau de Service)
- Transformation of normal bus lines into BRT (segregated right of way)
- Capacity similar to LRT and Tramways
- Focus on the urban integration
- Improving the quality of service (speed, regularity)
- Modern Busway (guidance, ITS...)

Complete Network using only buses

Different types of corridors:
- Express corridors 72km
- Feeders 270 km
- Inter-district corridors 185km
- Normal bus lines 573km

Different types of services
- Bi-articulated 20km/h
- Direct 30km/h
- Conventional 18km/h

Early stage of planning

High capacities with Buses (270 p/bus)

Cost effectiveness (3 million US$/km)
Traffic patterns - CURITIBA

NORTH 23 v/h
WEST 14 v/h
SOUTH 67 v/h
BOQUEIRÃO 41 v/h
EAST 35 v/h
Traffic patterns - CURITIBA

[Graph showing passenger flow and PT supply over years]
BOGOTA

Transmilenio

38 000 ppdph
around 240 bus pdph
(Main section)
Modeling - BOGOTA

- Identification of the saturation level – 160 pps
  - Commercial speed
  - Journey time

40000 ppdph

Average journey duration
Express journey duration
Omnibus journey duration

Journey duration / Capacity

Capacity (ppdph)

Average journey duration
Express journey duration
Omnibus journey duration
Future projects - BOGOTA
BRT modeling - Limits of capacity

2 lanes everywhere

2 lanes in station

1 lane everywhere
BRT - Limits of capacity

Commercial speed (km/h)

~2 km/h

1 lane everywhere: 150 buspdph, 15000 ppdph, 24000 ppdph
2 lanes in station: 300 buspdph, 30000 ppdph, 48000 ppdph
2 lanes everywhere: 300 buspdph, 30000 ppdph, 48000 ppdph

MRT Capacity (ppdph)

100 p/bus
160 p/bus
Operation costs including depreciation ($/seat.km)

- BRT in Developed countries
- MRT/LRT in Developed countries
- BRT in Developing countries
- MRT/LRT in Developing countries

Capacity pphpd

0 5000 10000 15000 20000 25000 30000 35000 40000
<table>
<thead>
<tr>
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<th>BRT</th>
<th>MRT</th>
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<tbody>
<tr>
<td>Commercial speed</td>
<td>20 to 30 km/h</td>
<td>&gt; 30 km/h</td>
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<tr>
<td>Capacity</td>
<td>&lt; 40000 ppdph</td>
<td>Up to 70000 ppdph</td>
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<tr>
<td>Regularity</td>
<td>Low</td>
<td>Good</td>
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<td>Investments costs</td>
<td>3 to 14 M$/km</td>
<td>&gt; 40 M$/km</td>
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<tr>
<td>Land use</td>
<td>High occupancy</td>
<td>Low occupancy</td>
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<td>Implementation</td>
<td>Easy</td>
<td>Difficult</td>
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<tr>
<td>Urban integration</td>
<td>Difficult</td>
<td>Easy if underground</td>
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<td>Flexibility</td>
<td>High</td>
<td>Low</td>
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<tr>
<td>Network imp.</td>
<td>Difficult</td>
<td>Easy</td>
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– **BRT relevance in developing countries:**
  - 10000 ppdph single track
  - 20000 to 30000 ppdph double track

– **Mode relevance: Diagnosis & planning**
  - Significant number of criteria
  - Uniqueness of each city

– **BRT Evolution: Long term planning**
  - Metro project (CURITIBA)
  - BRT Network (BOGOTA)