Bus Rapid Transit Solution
Bus Rapid Transit Success Factors
- A Reminder -

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Global trends in urban development

Urban dynamics

Demographic Change: growing and/or ageing urban populations

Urbanization & land use patterns: more megacities and shifting of city centres
Global trends in urban development

Transport needs more and more space

Individualization of Mobility Demands

People want to reach their destinations quicker, safer and more comfortable

Faster means of transportation

Existing systems become obsolete and reach their limits in terms of performance
What determines urban development?

Ecological, economical and social and safety issues

- Noise pollution
- Air pollution
- Traffic congestion slows down urban development. Long, expensive transport routes are cost-prohibitive for poorer population
- Public transport often needs public subsidies
- Financing new projects is often an open issue

Mobility means access to city life, quality of life, more social equality and fairness

The needs of pedestrians and cyclists
The starting point

Analysis of the current infrastructure and requirements

- Where are the traffic sources and destinations?
- What is the traffic flow profile?
- What requirements do traffic flows indicate?
- Where are the bottlenecks and weaknesses of the present system?
- Which solutions are available? How is it accepted and used? Is it cost-efficient?
- What kind of demand-analysis studies have been conducted? Which are still missing?

What should a new system offer?

(task definition, objectives)
The starting point

Investigating possibilities
## Bus Rapid Transit

### Common System Elements

<table>
<thead>
<tr>
<th>State of the Art Vehicles</th>
<th>Segregated Lines</th>
<th>Right of Way</th>
<th>Branding &amp; Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration with other Modes of Transportation</td>
<td>Intelligent Transport Systems (ITS)</td>
<td>Station Design &amp; Terminals</td>
<td>Stakeholders</td>
</tr>
<tr>
<td>Operational Frequency &amp; Flexibility</td>
<td>Operator Organization</td>
<td>Park &amp; Ride Bike &amp; Ride</td>
<td>Bikelanes Sidewalks</td>
</tr>
</tbody>
</table>
Advantages of BRT

Investment costs

Typical range of BRT system investment: 1 to 5.3 million USD per km
Typical range of Underground Metro system investment: 45 to 320 million USD per km

Johannesburg example: Cost of Gautrain project (80 km metro) would allow construction of approx. 1,400 km BRT infrastructure!

Bogotá Example: Two Systems at the same cost
Advantages of BRT

External costs

- BRT: Lower aggregate environmental costs
- BRT: Lower noise pollution levels
- Lower carbon dioxide emissions per person-kilometre

Average external costs caused by passenger traffic [€/1,000 PKM]

- Passenger Car: 61.6
- Bus: 15.6
- Rail-based PT: 21.2
Advantages of BRT

Speed of implementation

<table>
<thead>
<tr>
<th>Mode</th>
<th>Planning</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRT</td>
<td>2-3 years</td>
<td>approx. 1 year</td>
</tr>
<tr>
<td>Light Rail</td>
<td>2-3 years</td>
<td>at least 3 years</td>
</tr>
<tr>
<td>Metro</td>
<td>3-4 years</td>
<td>4-8 years</td>
</tr>
</tbody>
</table>
Advantages of BRT
Sustainability

High flexibility of BRT Systems:

- Bus routes are more flexible compared to light-rail systems, allowing easier system expansion or adjustments.
- Once installed, any changes to the rails, tracks and overhead wires of light-rail systems can be extremely costly and time-consuming.
- The lower average lifetime of buses allows timely fleet modernization and upgrading to more environmental-friendly technologies.

Average vehicle lifetime of mode of transport

<table>
<thead>
<tr>
<th>Mode of Transport</th>
<th>Lifetime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>10 – 15 years</td>
</tr>
<tr>
<td>Metro</td>
<td>35 – 40 years</td>
</tr>
</tbody>
</table>
### Bus Rapid Transit Elements in Praxis

#### Common elements relevant for BRT operation

- State of the Art Vehicles
- Segregated Lines Right of Way
- Branding & Marketing
- Integration with other Modes of Transportation
- High Operational Frequency
- Station & Terminal Design
- Intelligent Transport Systems (ITS)
- Park & Ride
- Bike & Ride
- Sidewalk & Bikelane Concepts

#### Additional revenue generation and cost reduction potential

- Stakeholders Participation
- Operator Organization Reform Change Management
- Winners & Losers Compensation Concepts
- Gender Mainstreaming
- Landuse & Transit Oriented Development
- Accessibility
- Urban Catalysis
- Impact Assessment
- Social Cost Benefit Analysis
BRT & Land use: Planning for Today and Tomorrow

Innovative Financing & Value Capture

Infrastructure Planning

BRT Project Development

BRT Project Implementation

Land Value Increase

Public Finance

Innovative Public Financing:
- Catchment Area Property Tax
- Catchment Area Business Tax
- Gasoline Tax

Policy Implementation

Land Value Capture
Visioning

Integrating Land Use Changes Into Transport Models

- What are the mayor urban development problems?
- Which environmental factors can be expected to change e.g. in the next 20-50 years?
- How will change affect my transport system and land use patterns?
- Which are potential interrelated effects?
- How can I adjust or optimize my land use patterns and public transport system?
- Visioning: How should my city evolve?
- Which mayor projects are to be expected in the near future?
- How can I best support projects e.g. with BRT systems?
- Model for different scenarios: “How does land use have to change in order to make corridor X economically feasible?”
Practical Examples

A single component does grant a BRT system’s success. Neglecting one factor in planning may cause the entire system to fail.

Cancun Planning Obstacle:
- Modelling was undertaken for status quo and general population increase only.
- Land use changes were not considered.
- Politics focused on most visual corridor only.
- No cost-benefit analysis was conducted.
- Time pressure.
- Conflicting interests: operators and planning agency vs. decision makers.
- Result: lack of trust in BRT plans due to lack of proof of financial feasibility.

Brasilia Planning Obstacle:
- Primary BRT corridor chosen based on political preferences.
- Corridor runs parallel to under-utilized metro.
- No cost-benefit analysis was conducted.
- Conflicting interests: planning agency vs. decision makers.
- Result: lack of trust in BRT plans due to lack of proof of financial feasibility.
Practical Examples
Planning Process Cancun, Mexico

1. Development of Strategic Urban Development Plan 2030
2. BRT concept as strategic project
3. First transport study for base data collection
4. GIS database (?)
5. Transport Modelling of „Status Quo“

- GIS-based adjustment of catchment areas for „Voter-Potential Maximization“
- Political agreement between stakeholders: NO
- Project Feasibility Confirmed: NO
- Modelling of Project Impact, Financial & Economic Feasibility: NO
- Route proposal based on status quo demand

- Political agreement between stakeholders?
- Formulation of Urban Development Policy Measures
- Adjustment of Landuse Legislation
- Decision for Pilot Corridor
BRT & Land use: Planning for Today and Tomorrow

Modeling land use changes and impacts on traffic demand and road network capacities

1. GIS-based spatial analysis „Status Quo“
2. Transport Modelling of „Status Quo“
4. Project Feasible: NO
   - Visioning of Landuse Changes

   - Political agreement: NO
5. GIS-based adjustment of catchment areas for „Voter-Potential Maximization“

   - Political agreement: YES
6. Formulation of Urban Development Policy Measures
7. Adjustment of Landuse Legislation
   - Decision for Pilot Corridor

   - Transport Modelling of „Landuse Change Scenario“
8. GIS-based analysis „Landuse Change Scenario“

   - Project Feasible: YES

BRT & Land use: Planning for Today and Tomorrow
Modeling station caption areas for reaching as many voters as possible!
BRT & Land use: Planning for Today and Tomorrow

Modeling land use changes and impacts on traffic demand and road network capacities

Passenger car demand changes in the road network induced by a new housing project

Public transport demand changes in the road network induced by a new housing project

Resulting impact on road network capacities
FIVE STEPS TO BRT

Consultancy regarding:

- Actual traffic situation
- Integrated planning
- Bus corridor and net planning
- Bus stop concepts, transfer stations, bus depots
- Integration of other means of transportation
- ITS, including ticketing solutions
We support you developing your system!

Thank you!