Integrated Transport Systems for Cities

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Structure

Session 1
Theory and Analytical Framework

Session 2
Case Studies
Session 1: Theory and Analytical Framework

What do we want from a city’s Transportation System?
What constitutes an Integrated Transport System?
How to design Integrated Transport Networks?

What are the technology options?
Alternatives Analysis: How do we evaluate the options?
What do we want from an City’s Transportation System?
Efficiency

- Congestion in Bangalore costs the city approximately Rs. 7,600 Crore per Year in lost economic output and excessive fuel use.

- This is ~5% of the city’s GDP.

Sources:
Efficiency

GDP

120,000 people die due to road traffic accidents annually (highest in the world)

Nearly 50% of these are pedestrians and other non-motorised transport users in million-plus cities

Traffic accidents are the #1 cause of death amongst males aged 18-35

Sources:
WHO (2012) “Global status on Road Safety”
NCRBI Annual Accident Database
**Safety**

Road Fatalities per million population (major Indian cities)

Sources:
Various – CDPs, CMPs, NCRBI Annual Accident Database
## Accessibility

<table>
<thead>
<tr>
<th>City</th>
<th>Distance to Public Transport Stop (Avg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhubaneshwar</td>
<td>0.78 km</td>
</tr>
<tr>
<td>Hubli-Dharwad</td>
<td>1.03 km</td>
</tr>
<tr>
<td>Bhopal</td>
<td>1.05 km</td>
</tr>
<tr>
<td>Kanpur</td>
<td>1.4 km</td>
</tr>
<tr>
<td>Nagpur</td>
<td>0.94 km</td>
</tr>
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<td>Hyderabad</td>
<td>0.6 km</td>
</tr>
<tr>
<td>Bangalore</td>
<td>0.99 km</td>
</tr>
<tr>
<td>Mumbai</td>
<td>0.74 km</td>
</tr>
</tbody>
</table>

Sources: Ministry of Urban Development, (2011), Traffic and Transportation Policies and Strategies in Urban India
Affordability

- In Lower Income Groups, transportation costs are approximately 15-20% of monthly average income.
- With the growth of the city and increasing land prices in the inner core areas, lower income groups are being shifted to the periphery, resulting in longer trip lengths, higher transport expenditure, and longer time spent in commute.

Sources: Mobility for Development (2008), Bangalore Case Study
High Quality of Service

- Comfortable
- Reliable
- Frequent
Environmental Sustainability

Estimated Growth in Emissions from Urban Transport – 2000 to 2030

+7.05% per year

Sources: Schipper et al (2008)
Contributes to desired urban form

How much area would we like to urbanise?

10 Million
2030

Density - 150 persons/ha
Area - 666 sqkm

Density - 125 persons/ha
Area - 800 sqkm

Density - 100 persons/ha
Area - 1000 sqkm

Density - 75 persons/ha
Area - 1333 sqkm

Sources: CEPT University
A good urban transport system should be

- Efficient
- Safe
- Accessible
- Affordable
- Provide a high quality of service
- Be Environmentally Sustainable and
- Contribute to the desired Urban Form of the city
What constitutes an Integrated Transport System?
There are 4 main characteristics of Integrated Urban Transport Systems
Characteristic #1:

Multimodal Mobility
The primary focus of transport investments is to promote public and non-motorized transport.

The variety of public motorised transport options should be as wide-ranging as necessary and appropriate.

The options run the range from the more common BRT, regular bus services, metro rail and commuter rail..... .......to formalised intermediate public transport, water transport, cable-cars.

Non-motorised transport options should also be expanded by improving pedestrian environments, providing bicycle lanes, and public bicycling schemes.
Multimodal Mobility

Commuter options in London
Characteristic #2:

Intermodal Connectivity
Building supply through high quality public transport isn’t enough

The key is to provide seamless connectivity across different modes

Different public motorized and non-motorized networks should be integrated to allow people the flexibility to make trip patterns that are most convenient for them
Intermodal Connectivity
Intermodal Connectivity
Characteristic #3:

Integration of Land Use and Transport
Integration of Land Use and Transport

Cities need to manage their growth and development patterns to ensure the creation of urban forms that both facilitate and reinforce the advantages of sustainable transport modes.

- Adopt development control regulations that promote densification along public transport corridors, and mixed-use neighbourhoods that promote walking and cycling for utility trips.

- Adopt such policies in long term development plans.
Integration of Land Use and Transport
Characteristic #4:

Disincentives for Private Vehicle Use
Policies that regulate the growth and usage of private vehicles are needed.

Private vehicles receive a large number of indirect subsidies (road construction, parking, fuel subsidies).

The nominal cost of private vehicle use should be brought in line with the real cost of associated externalities.

Such disincentives will further reinforce (and may even fund) public transport.
Disincentives for Private Vehicle Use

Options include:

- Congestion charge (Stockholm, London)
- Variable priced parking (Zurich, New York)
- Vehicle ownership license (Singapore)
- Number plate based usage restriction (Beijing, Bogota)
Summing up

An Integrated Urban Transport System is characterised by

- Multimodal Mobility
- Intermodal Connectivity
- Integration of Land Use and Transport and
- Disincentives for Private Vehicle Use
How to design Integrated Transport Systems?
Principle #1:

Design Complete Networks
Design Complete Networks

Broadly speaking, there are 2 dimensions

The physical/spatial dimension

The service/coverage dimension
Design Complete Networks
Design Complete Networks
Design Complete Networks
Design Complete Networks

BTS, MRT and ARL Systems Map

- BTS Skytrain Sukhumvit Line
- BTS Skytrain Silom Line
- MRT Metro Chaloem Ratchamongkhon Line
- ARL Airport Rail Link
- Under construction

EMBARQ India
Design Complete Networks

Sources:
Principle #2: Mobility at all scales
Mobility at all scales

**Mass Transport**
- BRT
- Metro Rail

**Public Transport/IPT**
- City Bus Service
- ‘Private Public Transport’

**Non-Motorized Transport**
- Walking
- Public Bicycling Schemes
Principle #2:

Integrate Services
Integrate Services

3 main dimensions to service integration

Physical Integration

Service Integration

Fare Integration
Integrate Services

Physical Integration

Physical Transfers between different modes should be as convenient as possible.

Transferring within the same facility vs. Exiting one system and entering another.

Interface between non-motorized and public motorized modes is also important.
Integrate Services

Service Integration

Services on different modes can be co-ordinated to improve efficiency and user experience.

Requires unified planning authority and/or high degree of co-operation between providers.
Integrate Services

- Fare Integration
  - Seamless ticketing across modes
  - Integrated pricing systems
  - Technology intensive and requires strong contractual frameworks
3 more principles:

Appropriate pricing for all modes
Urban design for accessibility and safety
Land use and transport integration policies
Thank You!

Questions?