Perspective On Public Transportation-India

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India
Components of Sustainable Urban Transport

- Mobility
- Emission and Air Quality
- Economic Opportunities
- Equity

Sustainable Urban Transport
NUTP’s Main features are:

1. Integrated land-use and transport planning
2. Equitable allocation of road space
3. Promoting use of public transport
4. Priority to non-motorized transport
5. Parking
6. Freight traffic
7. Legal and administrative issues
8. Capacity building
9. Use of cleaner technologies
10. Innovative financing mechanisms
11. Association of the private sector

Under these 11 main features, there are 31 sub-features.
The demand of passenger and commercial vehicles will fuel the demand for Diesel and Petrol in future.
The Challenges

Demand of Vehicles in India

Are we heading towards Sustainability?

Future Demand of Automobiles - 2013, 2015 and 2020
(Figures in Million)

- Construction Equipment
- Tractors
- Commercial Vehicles
- Passenger Vehicles
- Two and Three Wheelers

India is the world's largest manufacturer of tractors.

8th largest commercial vehicle manufacturer.

6th biggest passenger car manufacturer.

2nd largest producer of two wheelers and buses.
Barriers For Improvement Of PT

- Lack of political will
- Governance
- Opposition from key stakeholders (operators, motorists)
- Political and institutional inertia
- Institutional biases


- Lack of information
- Poor institutional capacity
- Inadequate technical capacity
- Insufficient funding and financing
- Geographical./physical limitations
Responsibilities for policy making, planning, investment, operations and management is divided in Central, State and Local Govt. organizations.

For example, Mumbai has 18 organizations responsible for transport.

Multiplicity results in (a) Fragmented Functional Responsibilities, (b) Lack of Local Expertise, (c) Paucity of Financial Resources and (d) Lack of Privatization.

Attempts for setting up UMTA failed.
Some Comparisons

**PUBLIC TRANSPORT SUPPLY LEVELS – GLOBAL AND INDIAN SCENE**

<table>
<thead>
<tr>
<th>Popn. range</th>
<th>PT Network (KM) Availability per 1 lac Population</th>
<th>% of Bus Share</th>
<th>Bus Supply Index/ 1 Lac Popn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Indian Scenario</strong></td>
<td><strong>Global Scenario</strong></td>
<td><strong>Indian Scenario</strong></td>
</tr>
<tr>
<td>20 - 40 lakh</td>
<td>7.16</td>
<td>34.62</td>
<td>22%</td>
</tr>
<tr>
<td>40 - 60 lakh</td>
<td>11.23</td>
<td>26.42</td>
<td>16%</td>
</tr>
</tbody>
</table>

**Popn density and PT density**

\[
y = 0.0003x - 0.8019 \\
R^2 = 0.7797
\]

**PT density (KM/Sq.KM) = PT network length (Km)/ City area (Sq.Km)**

<table>
<thead>
<tr>
<th>Pop. Density persons/sq.km</th>
<th>PT density (KM/Sq.KM)</th>
<th>UK (Optimistic)</th>
<th>India (Pessimistic)</th>
<th>Adopted (Realistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;750</td>
<td></td>
<td>0.3</td>
<td>-</td>
<td>0.3</td>
</tr>
<tr>
<td>750-1500</td>
<td></td>
<td>0.6</td>
<td>-</td>
<td>0.6</td>
</tr>
<tr>
<td>1500-2300</td>
<td></td>
<td>1.0</td>
<td>-</td>
<td>1.0</td>
</tr>
<tr>
<td>2300-3000</td>
<td></td>
<td>1.25</td>
<td>0.10</td>
<td>0.7</td>
</tr>
<tr>
<td>3000-3900</td>
<td></td>
<td>1.65</td>
<td>0.37</td>
<td>1.0</td>
</tr>
<tr>
<td>3900-4600</td>
<td></td>
<td><strong>2.0</strong></td>
<td><strong>0.58</strong></td>
<td><strong>1.1</strong></td>
</tr>
<tr>
<td>&gt;4600</td>
<td></td>
<td>2.5</td>
<td>0.85</td>
<td>1.7</td>
</tr>
</tbody>
</table>

It defines Pt network (Km) per Sq.Km area
DMRC - AT A GLANCE

- 7 Lines - 213 km Network Length (Partly Phase-III)
- 160 stations
- More than 1225 commissioned cars
- 160 Million Car Km/year (FY 2014-15)
- 2.7 Million passengers a day.
- **Max**: 3.2 Million on 28th August 2015
The Adoption

PASSENGER DEMAND

Av Ridership increased by 122% in last 5 years

* Till Oct’2015
**The Research**

### Behaviour of Passenger Towards Shift to Delhi Metro Feeder

<table>
<thead>
<tr>
<th>Mode</th>
<th>Percentage Shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car to Feeder Bus</td>
<td>1 %</td>
</tr>
<tr>
<td>2W to Feeder Bus</td>
<td>14 %</td>
</tr>
<tr>
<td>NMT to Feeder Bus</td>
<td>24 %</td>
</tr>
<tr>
<td>Auto to Feeder Bus</td>
<td>30 %</td>
</tr>
</tbody>
</table>

*NMT include Cycle & Battery Rickshaw because they have no priority over each other by the users.*

- The above result is obtained by stated preference survey of the passengers.
- The variables considered were travel time and travel cost.
- The saving in the above mentioned variables were calculated for different choices by the passengers.
- A binary logit model was developed to find out the willingness to shift from car, 2W, NMT & Auto by the passengers in the given choices that will improve the feeder bus service of the metro.
The Concept in Making

First mile
- Walking
- MINIBUSES
- RICKSHAWS
- Parking
- BIKES
- MOTOS
- CARS

Next to the central node:
- iPTN
- iPTN++
- BOATS
- METRO
- BUS

Last mile
- Walking
- MINIBUSES
- RICKSHAWS
- BIKES
- MOTOS
- CARS
City Bus Service Components

- Manpower & Training
- Property Development
- IT & Control Systems
- Operations
- Vehicles
- Planning Agency
- Bus stops & terminals
- Maintenance infrastructure
- Fare Collection infrastructure
- Integrated Parking
- Marketing & PR
- Regulatory Agency

City Bus Service Components
# Delivery of Urban Bus Services – Service Quality Standards

<table>
<thead>
<tr>
<th>SN</th>
<th>Quality Parameter</th>
<th>Formula</th>
<th>Specified Service Quality Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fleet utilization</td>
<td>No. of buses operated*100/ No. of buses scheduled</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>Bus utilization</td>
<td>Kms operated by all buses / Total no. of buses held</td>
<td>180</td>
</tr>
<tr>
<td>3</td>
<td>Occupancy Ratio</td>
<td>Avg. no. of passengers inside the bus per bus per day / capacity of the bus including standees</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>Trip Efficiency</td>
<td>No. of trips operated*100/ No. of Trips Scheduled</td>
<td>98 or better</td>
</tr>
<tr>
<td>5</td>
<td>Reliability of buses</td>
<td>Total no. of breakdowns*10000/ Total Kms operated</td>
<td>Less than 5</td>
</tr>
<tr>
<td>6</td>
<td>Safety of operations</td>
<td>No. of accidents*100000/ Total Kms operated</td>
<td>Preferably none</td>
</tr>
<tr>
<td>7</td>
<td>Punctuality</td>
<td>No. of trips on time at start*100/ Total no. of trips operated</td>
<td>98 or better</td>
</tr>
<tr>
<td>8</td>
<td>Cleanliness of buses</td>
<td>No. of buses observed or reported dirty*1000/ Total no. of bus trips operated</td>
<td>Nil</td>
</tr>
<tr>
<td>9</td>
<td>User Satisfaction</td>
<td>No. of complaints*1000/ total trips operated</td>
<td>Less than 2</td>
</tr>
<tr>
<td>10</td>
<td>Non Stoppage at Designated Points</td>
<td>No. of Stops where the bus stopped*100/Total number of stops on the route</td>
<td>90%</td>
</tr>
<tr>
<td>11</td>
<td>Non-Completion of entire trip</td>
<td>Total km operated per trip*100/total route length</td>
<td>95%</td>
</tr>
</tbody>
</table>
Narrative Examples

BRT in Ahmedabad
Cluster Bus System – Passenger Friendly Initiatives

Automatic Vehicle Location System (AVLS) based Real time Passenger Information System

Web and mobile application ‘Poochho’

From AVLS & ETM inputs passengers given information on bus ETA, seat availability
A Comprehensive Bus Management System
Anchored by trained staff and enabled by smart, scalable and robust IT System.
Smart Mobility Cards

Connected Wallet

- EMV Smart Card based Payments
- Mobile based Payments

- Buses
- Metro Trains
- Ferries

- Parking
- E-Commerce
- Retail Payments

Fare purchases for Kochi Public Transit
Non-Transit payments enablement
Public Transport Scenario in India

- Estimated modeshare for future years

<table>
<thead>
<tr>
<th>Population</th>
<th>2011</th>
<th></th>
<th></th>
<th></th>
<th>2021</th>
<th></th>
<th></th>
<th></th>
<th>2031</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PT</td>
<td>PV+IPT</td>
<td>NMT</td>
<td>PT</td>
<td>PV+IPT</td>
<td>NMT</td>
<td>PT</td>
<td>PV+IPT</td>
<td>NMT</td>
<td>PT</td>
<td>PV+IPT</td>
</tr>
<tr>
<td>&lt; 5 lakhs</td>
<td>4</td>
<td>59</td>
<td>36</td>
<td>3</td>
<td>66</td>
<td>31</td>
<td>2</td>
<td>72</td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 to 10 lakhs</td>
<td>8</td>
<td>42</td>
<td>50</td>
<td>6</td>
<td>51</td>
<td>43</td>
<td>5</td>
<td>58</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 to 20 lakhs</td>
<td>12</td>
<td>46</td>
<td>43</td>
<td>10</td>
<td>52</td>
<td>38</td>
<td>9</td>
<td>57</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 to 40 lakhs</td>
<td>9</td>
<td>49</td>
<td>42</td>
<td>8</td>
<td>51</td>
<td>41</td>
<td>8</td>
<td>52</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40 to 80 lakhs</td>
<td>21</td>
<td>45</td>
<td>35</td>
<td>15</td>
<td>51</td>
<td>34</td>
<td>12</td>
<td>54</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 80 lakhs</td>
<td>42</td>
<td>28</td>
<td>30</td>
<td>31</td>
<td>40</td>
<td>29</td>
<td>26</td>
<td>46</td>
<td>28</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

P.T-Public Transport. PV-Personalized Vehicles. IPT-Auto rickshaw. NMT-Non motorized transport including walk and cycles.

Ref: Study on Traffic & Transportation policies & strategies in urban areas in India – M.O.U.D (2008).
Complimentary Policies ....TOD........
The Redevelopment
The New Focus

Existing opportunity to act for Indian cities

Smart cities Mission
- 100 cities
- Central Allocation of INR 48000 Crore
- Smart cities challenge in progress

AMRUT: Atal Mission for Rejuvenation and Urban Transformation
- 500 towns
- Central Allocation of INR 50000 Crore
- Implementation Started

HRIDAY: Heritage City Development & Augmentation Yojna
- 12 cities
- Mission Launched
- Implementation Started

Ministry of Urban Development with State and Local Governments
New Initiatives

Smart Cities Programmes

- Retrofitting
- OR
- Redevelopment
- OR
- Greenfield development

Physical, social and Institutional governance

Focus Area
- Provide Universal accessibility
- Improve Last mile connectivity
- Provide NMT infrastructure - walkability
- Provide & Improve Public transport
- Integrated Multi-Modal Transport
Smart City Initiatives

Integrated Transport System

• 17.1 Kilometres of high capacity public transport system per 100 000 population (core indicator)
• 17.2 Kilometres of light passenger public transport system per 100 000 population (core indicator)
• 17.3 Annual number of public transport trips per capita (core indicator)
• 17.4 Number of personal automobiles per capita (core indicator)
• 17.5 Percentage of commuters using a travel mode to work other than a personal vehicle (supporting indicator)
• 17.6 Number of two-wheel motorized vehicles per capita (supporting indicator)
• 17.7 Kilometres of bicycle paths and lanes per 100 000 population (supporting indicator)
• 17.8 Transportation fatalities per 100 000 population (supporting indicator)
• 17.9 Commercial air connectivity (number of non-stop commercial air destinations) (supporting indicator)
Smart City Initiatives

- 17.10 The city should have a good quality, efficient, sound, reliable city bus system (core indicator)
- 17.11 A Smart City should have a network of high quality Bus Rapid Transit System (support indicator)
- 17.12 The City bus system should also be planned to include complementary modes like mini and midi buses.
- 17.13 The smart city should have a network of public cycle scheme (core indicator)
- 17.14 Smart city should have a rickshaws as feeders to mass transit stations (support indicator)
- 17.15 A smart city should have implementation plan for transit oriented development in specific zones. (core indicator)
- 17.16 Urban Transport Network (Core Indicator)
- 17.17 Design Components- Cross Sections of Roads (Core Indicator)
- 17.18 Grade Separated Facilities (Core Indicator)
- 17.19 Intersections (Core Indicator)
- 17.20 Traffic management(Core Indicator)
- 17.21 Parking Development Strategy (Core Indicator)
- 17.22 Intervention of Intelligent Transport System (Core Indicator)
Some Actions...........
Awareness Campaigns

Image: Two individuals holding a sign that reads "मैं बनाऊंगा POLLUTION FREE DELHI."
Some Results ............
Integration ............

Currently made across 303 tolls and expanding
[1] China's target reflects gasoline fleet scenario. If including other fuel types, the target will be lower.
## Vehicle Classification

<table>
<thead>
<tr>
<th>Vehicle Category</th>
<th>Category Name</th>
<th>Category Details (GVW in Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buses (Carrying Passengers)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category – M₁</td>
<td>Car</td>
<td>&lt; 3.5T</td>
</tr>
<tr>
<td>Category – M₂</td>
<td>Bus</td>
<td>&lt; 5T</td>
</tr>
<tr>
<td>Category – M₃</td>
<td>Bus</td>
<td>&gt; 5T</td>
</tr>
<tr>
<td><strong>Trucks (Carrying Goods)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category – N₁</td>
<td>LCV</td>
<td>≤ 3.5T</td>
</tr>
<tr>
<td>Category – N₂</td>
<td>MCV</td>
<td>&gt; 3.5T ≤ 12 T</td>
</tr>
<tr>
<td>Category – N₃</td>
<td>HCV</td>
<td>&gt; 12 T</td>
</tr>
</tbody>
</table>
Thank You!

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