Assessing the role of rickshaws in sustainable urban transport for Indian Cities

Madhav Pai
Director EMBARQ – India Program
Transforming Transportation, Jan 2011
Growing Sales

Significant Usage

Significant Market

Source: City Traffic & Transportation Plans (CTTPs)
* Mumbai shares include Taxis

Auto-Rickshaw Trip Lengths compared to Average Trip Lengths (Indian cities)


IPT Trip Lengths (2007)

- Average Trip length (All Modes)
- Auto Rickshaw Trip Length

Kms
Are Auto-rickshaws Part of a Sustainable Urban Transport System

1. Do they promote traffic safety?
2. Are they environmentally friendly?
3. Do they lead to net reduction in vehicle kilometres traveled (VKT)?
4. Do they promote social equity in urban transport?
5. Do they lead to reduced impacts on public spaces (need for less parking)?
Safety

Objective: Assessment of the relative contribution of motorized modes on pedestrian fatalities relative to their share of Passenger Kilometres Traveled (PKT)

Pedestrians constitute a large share of road fatalities in Indian cities

Source: Transportation Research and Injury Prevention Programme (TRIPP), IIT Delhi, April 2004

Source: Mumbai Traffic Police, Road Fatality Data

Source: National Institute of Mental Health and Neuro Sciences (NIMHANS), Bangalore
Normalizing for VKT

Mumbai

Share of VKT

Contribution to Pedestrian Fatalities

Bangalore

Share of VKT

Contribution to Pedestrian Fatalities

1 IPT stands for Intermediate Public Transport including auto-rickshaws and taxis
2 Figures in brackets represent number of fatalities per 1,000,000 VMT
Source: Comprehensive Transportation Study for Mumbai Metropolitan Region, July 2008; and Mumbai Traffic Police

IPT stands for Intermediate Public Transport (including auto-rickshaws and taxis)

Figures in brackets represent number of fatalities per 100,000 PKT
Social Equity

1. Low cost mobility for lower income, elderly and disabled population
2. Low cost mobility for school children in the absence of school buses
3. Low cost alternative in the case of poor city bus services (Rajkot, Surat) as Shared Fixed-route services
4. Commonly used mode for transporting victims from accident sites to hospitals
**Environment**

**PM10 Sources**

- **Ground level** (around high activity areas)
  - Road dust
  - Motorized transport
    - Diesel
    - 2-stroke engines

- **Ground level** (around low activity areas)
  - Landfills

- **Higher level**
  - Industries

**State of PM10 Emissions in Indian Cities, 2007**

- Critical (>150% of standard): 52%
- High (between 100-150% of standard): 30%
- Moderate (between 50-100% of standard): 15%
- Low (less than 50% of standard): 2%

**Source:** Central Pollution Control Board, National Air Quality Monitoring Program (NAMP)

**PM10 reduction strategies**

- Reducing scavenging losses
- Alternative fuels
  - CNG
- Phased conversion to 4-strokes
- Improved catalytic converters

**City** | **Population** | **Number of auto-rickshaws** | **% 2-stroke**
---|---|---|---
Mumbai | 18 million | 150,000 | 50%
Pune | 3.5 million | 60,000 | 90%
Surat | 3.3 million | 50,000 | 90%

**Source:** Surveys, EMBARQ, 2010
<table>
<thead>
<tr>
<th></th>
<th>daily</th>
<th>monthly</th>
</tr>
</thead>
<tbody>
<tr>
<td>fuel cost per kg</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>mileage rs per kg</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>rental cost</td>
<td>150</td>
<td>4500</td>
</tr>
<tr>
<td>fuel cost</td>
<td>125</td>
<td>3750</td>
</tr>
<tr>
<td>revenue</td>
<td>550</td>
<td>16500</td>
</tr>
<tr>
<td>kms</td>
<td>75</td>
<td>2250</td>
</tr>
<tr>
<td>rev kms</td>
<td>55</td>
<td>1650</td>
</tr>
<tr>
<td>dead kms</td>
<td>27%</td>
<td>27%</td>
</tr>
<tr>
<td>income</td>
<td>275</td>
<td>8250</td>
</tr>
</tbody>
</table>
## Proposed Model

What is Scale 10, 100, 1,000, 10,000 or 100,000?

Who keeps the additional revenue?
According to research conducted on carsharing’s impact on vehicle ownership, between “9 to 13” vehicles are removed from the road by each carsharing vehicle.

“Driver” based “Vehicle Sharing” systems, like auto-rickshaws, will play a key role in Indian cities in controlling private car ownership.

Source: EMBARQ Vehicle Sharing Framework
<table>
<thead>
<tr>
<th>Issue</th>
<th>Specifics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance</td>
<td>Lack of a multi-modal governing body</td>
</tr>
<tr>
<td></td>
<td>Inadequate involvement of key stakeholders in policy making</td>
</tr>
<tr>
<td></td>
<td>(city government; manufacturers; unions; citizens; civil society)</td>
</tr>
<tr>
<td>Regulation</td>
<td>Lack of transparency in permits and fare policies</td>
</tr>
<tr>
<td></td>
<td>Lack of policies to drive formalization of services (such as fleet companies)</td>
</tr>
<tr>
<td>Unorganized sector</td>
<td>Lack of employment benefits</td>
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<td></td>
<td>Poor inspection/maintenance</td>
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<tr>
<td></td>
<td>Problems with financing</td>
</tr>
<tr>
<td></td>
<td>Lack of brand image and poor driver behavioral practices</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Lack of provision of adequate stands</td>
</tr>
<tr>
<td></td>
<td>Inadequate servicing centers for 4-stroke engines</td>
</tr>
<tr>
<td>Vehicles</td>
<td>Problems with design (comfort, rain)</td>
</tr>
<tr>
<td></td>
<td>2-stroke engines still prevalent in many cities</td>
</tr>
<tr>
<td>Operational inefficiencies</td>
<td>Significant empty trip making</td>
</tr>
</tbody>
</table>
## City Case Study

### Auto-rickshaw market characteristics

<table>
<thead>
<tr>
<th>City</th>
<th>Pop. (Mi.)</th>
<th>Market Size</th>
<th>Permit Policy</th>
<th>Engine</th>
<th>Fuel</th>
<th>Driver Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>13.5</td>
<td>55,000</td>
<td>Closed</td>
<td>4 stroke (90-95%)</td>
<td>CNG (100%)</td>
<td>Around 60 -70% rental –drivers</td>
</tr>
<tr>
<td>Mumbai</td>
<td>18</td>
<td>120,000</td>
<td>Closed</td>
<td>2 &amp; 4 stroke (50%)</td>
<td>CNG (100%)</td>
<td>Around 50% rental – drivers</td>
</tr>
<tr>
<td>Rajkot</td>
<td>1.5</td>
<td>15,500</td>
<td>Open</td>
<td>2-stroke (80-90% )</td>
<td>95% CNG</td>
<td>Around 75% owner-drivers</td>
</tr>
<tr>
<td>Pune</td>
<td>5.5</td>
<td>60,000</td>
<td>Closed</td>
<td>2-stroke (90-95%)</td>
<td>90% Petrol (10% CNG)</td>
<td>Around 65% renter-drivers</td>
</tr>
<tr>
<td>Surat</td>
<td>3.3</td>
<td>60,000</td>
<td>Open</td>
<td>2-stroke (90-95%)</td>
<td>100% CNG</td>
<td>Around 50% owner-drivers</td>
</tr>
<tr>
<td>Jaipur</td>
<td>3.2</td>
<td>18,500</td>
<td>Closed</td>
<td>4-stroke (90%)</td>
<td>90% diesel (10% LPG)</td>
<td>More than 75% renter-drivers</td>
</tr>
</tbody>
</table>

Source: EMBARQ Survey, August 2010
## City Case Study

### Common Auto-rickshaw Issues

<table>
<thead>
<tr>
<th>City</th>
<th>Lack of Governance</th>
<th>PM Emissions</th>
<th>Infrastructure</th>
<th>Unregulated Fixed route Shared-auto Operations</th>
<th>Unorganized Sector (operational inefficiencies; lack of benefits)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2-stroke</td>
<td>Diesel</td>
<td>Inadequate stands and amenities</td>
<td>Lack of I&amp;M infrastructure</td>
</tr>
<tr>
<td>Delhi</td>
<td>√</td>
<td></td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Mumbai</td>
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<td>√</td>
<td>√</td>
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<tr>
<td>Rajkot</td>
<td>√</td>
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<td>√</td>
</tr>
</tbody>
</table>
City Case Study

Vehicle Emissions
- 2-stroke
- Diesel

Source: EMBARQ Survey, Rajkot City, August 2010
City Case Study

Overloading
City Case Study

- Lack of stands

Source: EMBARQ Survey, Rajkot City, August 2010
Inter modal transfers
Inter modal transport
## Initial Successes in Indian Cities

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Where</th>
<th>Benefits</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion to CNG fuel</td>
<td>Mumbai, Delhi, Rajkot, Ahmedabad, Surat, Pune</td>
<td>Reduced operating cost; Reduction in emissions (in 4-strokes)</td>
<td>CNG supply would be challenge when implementing in other cities</td>
</tr>
<tr>
<td>Private entrepreneurship</td>
<td>Pune, Bangalore (pilots)</td>
<td>Increased earnings; employment benefits; brand image</td>
<td>Policy changes to facilitate these services; Attracting investors to scale up</td>
</tr>
<tr>
<td>SIAM - SAFE initiative</td>
<td>National</td>
<td>Driver safety training</td>
<td>Poor on-road enforcement</td>
</tr>
<tr>
<td>Advertising</td>
<td>Mumbai</td>
<td>Brand image; value-added services; increased earnings</td>
<td>Policy changes to facilitate this on a larger scale</td>
</tr>
<tr>
<td>Direct fuel injection for 2-stroke engines</td>
<td>Bangalore (pilot)</td>
<td>Improved fuel efficiency; Reduction in PM10 emissions</td>
<td>Costs; Participation from the driver community</td>
</tr>
</tbody>
</table>
Terminals

Queues @ Thane Station
Entrepreneuship

Dial-a-Rickshaw (DAR)

Easy Auto, Bangalore

Tuk-Tuk, Chandigarh

Auto-rickshaw Star Club, New Delhi

India Commutes, Pune

Call Auto

Chennai

Any-Time Rickshaw (ATR), Ahmedabad

Dial-a-Rickshaw (DAR)

G-Auto, Ahmedabad

Meter Down, Mumbai

Autotisement, New Delhi

Advertising

India's First Auto Rickshaw Magazine
Key Stakeholders

- Urban Local Bodies
- Transport Authority
- Users
- Driver / Owners
- Unions
- Manufactures
- Civil Society

Stakeholder in Auto Rickshaw Operations
Improved Governance and Policy Regime

- Improved policy regime (governance, fares, permits, fleet companies)
- Dedicated governing cell/body
- Involvement of all stakeholders in regulation

Inclusive planning as integrated public transport

- Shared feeder services at transit hubs

Enterprise based services

- Managed fleet companies
- Technology-based value added services

Environmental sustainability

- Operational efficiency
- Mitigating 2-stroke emissions

Infrastructure

- Auto-rickshaw stands
- Inspection, maintenance and servicing facilities

Centre for Sustainable Transport

EMBARQ Network
Next Steps

Recognizing the role of Auto rickshaw in SUT

Engaging stakeholders in reform process

Identifying and prioritizing the reform areas
Delhi plans ban on autorickshaws
Indian capital looks to phase out famous green and motorised three-wheelers, citing pollution and rude drivers.

Jason Burke in Delhi

guardian.co.uk, Thursday 18 March 2010 17.46 GMT

A Day Without Auto Rickshaws: Inconvenience, Intimidation and Corruption

Submitted by Megan McConville on April 7, 2010

Most drivers of Delhi’s 55,000 registered and 25,000 illegal autorickshaws are poor and live in the city’s slums. Photograph: Arko Datta/EPA.

The Indian capital’s streets are notorious for the swarms of green and yellow autorickshaws – and for their surly, betel nut-chewing and overcharging drivers.
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