Air Pollution Crisis Measure and Traffic Management in Shanghai and Beijing

Pan Haixiao, Professor
Department of Urban Planning, Tongji University
1239 Siping Road, Shanghai 200092, China
E-mail: hxpank@online.sh.cn
1. Introduction
Shanghai Location & Region

- Total area of 6,340.5 km²

Population of around

17 million (2003)
18.6 million (2007)
25 million (2015)
Land Use Change

Shanghai 2013

Beijing 1987- 2014 4.5 times

1990-2000 X 1.74
2000-2010 X 1.78
2010-2013 X 1.19

Builtup Area (X10 Sq.km)
China is now the number one motorized vehicle producer

Private Motorized Passenger Vehicle 2001-2014

X10 from 2005

10 million more/Year
Shanghai Travel Demand Change Comparing with 1986(=1)

Travel Demand Comparing with 1986

- Trip
- Distance
- Trip*Distance


较1986年的倍数

4.0
2.5
1.6

Trip
Distance
Trip*Distance
Motorized Vehicle/POP, GDP Comparing with Beijing

- Beijing
- Shanghai
- Tianjin
- Guangzhou
- Chengdu
- Chongqing
- Shenzhen
- Wuhan
- Nanjing
- Hong Kong

- MV/POP
- MV/GDP
2. Control on motorized vehicle license auction

Private Car in Beijing and Shanghai

- Shanghai vs. Beijing Population:
  - Shanghai > Beijing

- GDP:
  - Shanghai > Beijing

- Car:
  - Shanghai >>> Beijing: 3 Million Less
## Car Ownership Control Introduced in More and More City

<table>
<thead>
<tr>
<th>Measure</th>
<th>City</th>
<th>Year of Begin</th>
<th>Plate Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bidding</td>
<td>Shanghai</td>
<td>1994</td>
<td>USD12,500</td>
</tr>
<tr>
<td>Lottery</td>
<td>Beijing</td>
<td>2010,12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Guiyang</td>
<td>2011,7</td>
<td></td>
</tr>
<tr>
<td>Bidding+Lottery</td>
<td>Guangzhou</td>
<td>2012,7</td>
<td>USD4000</td>
</tr>
<tr>
<td></td>
<td>Tianjin</td>
<td>2014,1</td>
<td>USD4500</td>
</tr>
<tr>
<td></td>
<td>Hangzhou</td>
<td>2014,3</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>Shenzhen</td>
<td>2014,12</td>
<td>?</td>
</tr>
<tr>
<td>Two Car/Family</td>
<td>Shijiazhuang</td>
<td>2013,6</td>
<td></td>
</tr>
</tbody>
</table>
### Higher Parking Fee Policies

#### Parking Fee Management in Shanghai

<table>
<thead>
<tr>
<th>Area</th>
<th>Daytime</th>
<th></th>
<th>Night (Yuan)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First hour (Yuan)</td>
<td>Extra half hour (Yuan)</td>
<td></td>
</tr>
<tr>
<td>Key area in inner city</td>
<td>15</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Other area in inner city</td>
<td>10</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Area between inner/outer ring</td>
<td>7</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Parking Space Requirement: from Bottom limits to Upper Limits
Problems:

1. Park fee doesn’t increase with the CPI, so the effect of this policy gradually failed.

2. Park fee has no difference between cars with different emission of CO2, so this policy can’t encourage people use the cars with low-carbon emission.
No More Road Extension in History Areas
from more road for car
to shift the mode of travel
3. Strengthen public transport

Achievement

Extend Bus Service from City to Suburban, 20,000 Bus

High Quality Taxi Service (before)

Large Scale Metro Construction, 14 Metro lines, > 600km
366 Station

1000km Metro, 1000km Tramway, 500km Suburban railway in Planning

Ticketing, Relative High in Shanghai, Attractive of Middle Incomer
Too Low in Beijing, Over Crowded
Metro Increased Each Year

New Length (km, Shanghai Beijing)

- Beijing
- Shanghai

Shanghai EXPO
Beijing Metro

18 Lines, 554 km

Bus 876
Lines, 23287 Bus
# 4. Land Use Control

<table>
<thead>
<tr>
<th>Area</th>
<th>Population (10^3)</th>
<th>Density (10^3 People/Km^2)</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Wide</td>
<td>6340</td>
<td>24500</td>
<td>3.9 City Wide</td>
</tr>
<tr>
<td>Central City</td>
<td>660</td>
<td>12000</td>
<td>18.3 Outer Ring</td>
</tr>
<tr>
<td>City Core</td>
<td>108</td>
<td>4080</td>
<td>37.8 Inner Ring</td>
</tr>
</tbody>
</table>
Emphasize the idea of **neighborhood unit**, strictly regulate to provide residential area with all kinds of public service facilities

<table>
<thead>
<tr>
<th>Residential District</th>
<th>Building Area</th>
<th>Land Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1668-3293</td>
<td>2172-5559</td>
</tr>
<tr>
<td></td>
<td>2228-4213</td>
<td>2762-6329</td>
</tr>
<tr>
<td>Education</td>
<td>600-1200</td>
<td>1000-2400</td>
</tr>
<tr>
<td>Hospital</td>
<td>78-198</td>
<td>138-378</td>
</tr>
<tr>
<td></td>
<td>178-398</td>
<td>298-548</td>
</tr>
<tr>
<td>Culture and Entertainment</td>
<td>125-245</td>
<td>225-645</td>
</tr>
<tr>
<td>Commercial</td>
<td>708-910</td>
<td>600-940</td>
</tr>
<tr>
<td>Community Service</td>
<td>59-464</td>
<td>76-668</td>
</tr>
<tr>
<td>Financial</td>
<td>20-30</td>
<td>25-50</td>
</tr>
<tr>
<td></td>
<td>60-80</td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>40-150</td>
<td>70-360</td>
</tr>
<tr>
<td></td>
<td>460-820</td>
<td>500-960</td>
</tr>
<tr>
<td>Administration</td>
<td>46-96</td>
<td>37-72</td>
</tr>
</tbody>
</table>
Office Building mixed with shopping center, Higher rent, less car dependent
Beijing Low Density Around Station, Destination is far away from Station
Commuting Dist. 500 m around Metro Station in Shanghai
Bicycle Infrastructure in Shanghai

Beijing Riding Bike is Difficulty or Dangerous
Public Bike around Station Area in Periphery Area
Shanghai Bike Parking replace Car Parking
6. Modal Split

Modal Split in Central City, Shanghai

<table>
<thead>
<tr>
<th>Year</th>
<th>WK</th>
<th>TWV</th>
<th>PC</th>
<th>TX</th>
<th>PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>25.3</td>
<td>17.5</td>
<td>16.8</td>
<td>19.2</td>
<td>8.2</td>
</tr>
<tr>
<td>2012</td>
<td>25.1</td>
<td>19.9</td>
<td>16.2</td>
<td>30.5</td>
<td>7.7</td>
</tr>
<tr>
<td>2013</td>
<td>25</td>
<td>20.2</td>
<td>16.2</td>
<td>31</td>
<td>7.7</td>
</tr>
<tr>
<td>2014</td>
<td>25</td>
<td>20.3</td>
<td>15.9</td>
<td>31.3</td>
<td>7.4</td>
</tr>
<tr>
<td>2015</td>
<td>24.8</td>
<td>20.5</td>
<td>15.7</td>
<td>31.5</td>
<td>7.4</td>
</tr>
</tbody>
</table>
Declare to Improve Bike
Beijing Shift More Road Space for Public Transport

Passenger Volume Change B/A the Bus Lane on Jingtong Expressway (Evening Peak)

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>Day of Open</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus</td>
<td>57832</td>
<td>60579</td>
<td>62521</td>
</tr>
<tr>
<td>Metro</td>
<td>39241</td>
<td>38850</td>
<td>38733</td>
</tr>
<tr>
<td>Car</td>
<td>7588</td>
<td>4583</td>
<td>6630</td>
</tr>
</tbody>
</table>

Bus Speed Change

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus Speed (km/h)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Before | After
Shanghai in the Future
Shanghai More Public Transport and WTV/Walking, Less Car

Trips by Mode towards 2040

- **2014**
  - Private MV
  - Transit
  - Walking/Bike

- **2020**
  - Private MV
  - Transit
  - Walking/Bike

- **2040**
  - Private MV
  - Transit
  - Walking/Bike

Legend:
- Orange: Private MV
- Blue: Transit
- Green: Walking/Bike
Pudong Less Constrain, But more Car Dependence
8. Comments.

Do it Early and Quickly, Fast Development  
also High Opportunity to Change

Integration of Land Use and Transport/Integrated Approach

Accept Challenge, Constrains—Consensus, Cross Border

Importance of 3S Vehicle for Mobility, Quality of Life, Envior.  
  Small Size  
  Slow Speed  
  Short Range

Thanks!