Challenges and Strategies of Urban Transport in Beijing

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Outline

1. Current situation
2. The Challenges
3. Thinking Beyond
Beijing Capital International Airport (BCIA)

Passenger throughput: **78.67 million** (2011), ranked 2\textsuperscript{nd} in the world; the world largest integrated terminal—Terminal 3

The Capital Airport was put into use
Passenger throughput: **95000**
Freight & mail throughput: **12700** tons

The Terminal 1 was put into use
Passenger throughput: **1.214 million**
Freight & mail throughput: **46.8 thousand** tons
Aircrafts taking off/landing: **19.8 thousand** times

Terminal 1/Terminal 2/Terminal 3
Passenger throughput: **78.67 million**
Freight & mail throughput: **1.64 million** tons
Aircrafts taking off/landing: About **533 thousand** times
Outbound Transport —— Railway

- Beijing is an important railway hub in China
- Until 2010, Beijing railway mileage has reached 1067 km and the passenger volume reached 97.55 million
- In the future, there will be seven railway passenger hubs, ten railway lines, four passenger lines, four intercity railway lines, and three loop rail lines.

Distribution of Beijing railway hubs
Beijing's first expressway named G4 Beijing–Hong Kong–Macau Expressway was launched in 1986.

The operating mileage of Beijing expressway increased from 548 km in 2005 to 922 km in 2010.
Urban Public Transport — Rail Transit

At present, there are totally 16 lines and the mileage has reached to 456 km. The passenger volume per day is 6.73 million.

- **1987**
  - Number of lines: 2
  - Operating mileage: 40km
  - Passenger volume per day: 530 thousand

- **2003**
  - Number of lines: 4
  - Operating mileage: 114km
  - Passenger volume per day: 1.290 mln

- **2012**
  - Number of lines: 16
  - Operating mileage: 422km
  - Passenger volume per day: over 10 mln
Urban Public Transport — Bus

1949:
- Lines: 11
- Vehicles: 164
- Passenger volume: 79 thousands

1978:
- Lines: 118
- Vehicles: 2627
- Passenger volume: 4.6 million

2003:
- Lines: 775
- Vehicles: 18667
- Passenger volume: 10.1 million

2012:
- Lines: 779
- Vehicles: 22093
- Passenger volume: 13.89 million

BRT

2004, Southern Central Axis BRT

2008, Anli Road BRT

2008, Chaoyang Road BRT

April 2012, the plan for Fushi Road BRT was approved

Taxi

Prior to the reform & opening up
- 2000 taxi cars

1995
- There were 62965 taxi cars

2011
- There were 66600 taxi cars
**The Challenges**

◆ **Real-time Traffic Congestion Index**

<table>
<thead>
<tr>
<th>区域名称</th>
<th>交通指数</th>
<th>拥堵等级</th>
<th>平均速度 (km/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>三环内</td>
<td>1</td>
<td>轻度</td>
<td>37</td>
</tr>
<tr>
<td>二环内</td>
<td>1</td>
<td>轻度</td>
<td>39.2</td>
</tr>
<tr>
<td>三环内三环外</td>
<td>1.3</td>
<td>轻度</td>
<td>35.8</td>
</tr>
<tr>
<td>三环至四环</td>
<td>1.2</td>
<td>轻度</td>
<td>37.2</td>
</tr>
<tr>
<td>四环至五环</td>
<td>0.9</td>
<td>轻度</td>
<td>41.1</td>
</tr>
<tr>
<td>东城区</td>
<td>0.8</td>
<td>轻度</td>
<td>40.0</td>
</tr>
<tr>
<td>西城区</td>
<td>1.1</td>
<td>轻度</td>
<td>38.0</td>
</tr>
<tr>
<td>海淀区</td>
<td>1.1</td>
<td>轻度</td>
<td>38.0</td>
</tr>
<tr>
<td>郊城区</td>
<td>1.1</td>
<td>轻度</td>
<td>38.0</td>
</tr>
<tr>
<td>丰台区</td>
<td>1.2</td>
<td>轻度</td>
<td>37.1</td>
</tr>
<tr>
<td>冀西山区</td>
<td>0.8</td>
<td>轻度</td>
<td>41.2</td>
</tr>
</tbody>
</table>

4月20日 星期一 限行尾号3和8 20:25 — 20:30 实时路况

【最新运行评价报告】
- 北京市2009年交通运行报告 pdf
- 北京市2010年交通运行报告 pdf
- 北京市2011年交通运行报告 pdf
- 北京市2012年上半年交通运行报告 pdf

http://www.bjtrc.org.cn/PageLayout/IndexReleased/Realtime.aspx
Traffic Performance Index

月交通指数变化
Traffic congestion index monitoring (2007.1-2012.4 workday)

- 不限行 No Restrict
- 奥运“单双号” Odd-even number plates restriction
- 每周一高峰限行 Restrict Regional Traffic in Rush Hour on Working Days
- 每周少开一天 One day driving ban

Traffic congestion levels:
- Free Flow
- Smooth Traffic
- Light Congestion
- Medium Congestion
- Heavy Congestion
- Severe Congestion

Years: 2007 to 2012
The Black Friday: Sep 17, 2012

Congestion Index

Queues in 1069 km
2. Congestion Evaluations

- Traffic Congestion Index in avg. 4.6, reduced by 21.2%
- Daily Congestion Time decreased by 56%。

![Congestion Index Graph](chart1.png)

![Congestion Index Graph](chart2.png)
2. Congestion Evaluations

- Parking Management and Enforcement (April 1, 2011)
Effects of TDM

Rail Transit Passenger Boarding Changes

(2011年对比2010年)

10,000 boardings

1月1日 1月15日 1月25日 2月1日 2月15日 2月25日 3月1日 3月15日 4月1日
Outline

1. Current situation
2. The Challenges
3. Thinking Beyond
（1）Continue growth of the population

- Beijing has attractive more and more outcomers in recent years. The city’s transport system now serves over 20 million people.
- Beijing will remain attractive to adjacent region in the future. It’s estimated that the city’s population may continue increase.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>2400</td>
</tr>
<tr>
<td>1975</td>
<td>2700</td>
</tr>
<tr>
<td>1985</td>
<td>3000</td>
</tr>
</tbody>
</table>

Urbanization rate of Beijing & neighboring regions
There will be more commute from suburban region to the city center. A 30 km ring based on subway transport has been formed.

- The commune area will expand from 30 km to 50 km.
- New towns in near suburban area, towns and counties in far suburban areas or even neighboring Hebei province may be included in the commune ring.
(3) Huge growth of transport demands

By 2030,

➢ Daily transport total 89 million, 1.54 times of the current number. The growth speed exceeds the highest speed of the Tokyo city ring.

➢ Daily transport turnover 880 million, 2.3 times of the current number.
The Challenges

Overwhelming motorization

- The motor vehicle growth rate and ownership of Beijing are obviously higher than Tokyo and Seoul
The relationship between car ownership and the urban population density is deformed

- Downtown car ownership 2-3 times of the world city average
- Lottery plate system helps curb car ownership growth. But potentials remain high. The cars increased are mainly concentrated in the city center

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**The Challenges**

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The relationship between car ownership and the urban population density is deformed

- Downtown car ownership 2-3 times of the world city average
- Lottery plate system helps curb car ownership growth. But potentials remain high. The cars increased are mainly concentrated in the city center
Inefficient use of scarce road resources

- Beijing downtown road system takes on 118 million vehicle km transport everyday, almost twice of average of world cities, close to maximum.

- Passenger vehicles are more frequently used in Beijing than Tokyo for commune, daily uses and business occasions.

- 44% of car driving are for distance less than 5 km.

<table>
<thead>
<tr>
<th></th>
<th>Downtown</th>
<th>Mileage (km)</th>
<th>Road area (km²)</th>
<th>Vehicle km</th>
<th>Unit road area vehicle km (km/km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beijing</td>
<td>6258</td>
<td>92</td>
<td></td>
<td>118 mln</td>
<td>128</td>
</tr>
<tr>
<td>Tokyo</td>
<td>11841</td>
<td>101</td>
<td></td>
<td>60 mln</td>
<td>59</td>
</tr>
</tbody>
</table>

The Challenges
Parking problems have become increasingly prominent. 2011 parking price adjustment has shown some effect. But the problem soon rebounded.

- Parking capacity of some side parking area 1.7 times of what’s allowed
- Almost 70% of living space in some community is taken up by parking
- Free parking rate rose from 73% in 2005 to 86% in 2010 in the six downtown districts.
- Frequent conflicts seen because of parking.

Parking causes social conflicts.

- **Low cost of passenger cars**: free and cheap parking lots lure over consumption of passenger cars
- **Worse life quality**: more road and living space taken by passenger cars
- **Questions over social fairness**: the average living space per capita in Beijing is 28m², while the parking space is 30-40m².
At present, the transport links with the city center still mainly rely on roads (including highways). The track bears less than 10%, far below the level of 70-80% of world cities.

Severe traffic jam (lowest speed 13.8km/h)

<table>
<thead>
<tr>
<th></th>
<th>Tokyo</th>
<th>London</th>
<th>New York</th>
<th>Paris</th>
<th>Beijing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suburban rails (km):</td>
<td>2031</td>
<td>3650</td>
<td>3000</td>
<td>1867</td>
<td>---</td>
</tr>
<tr>
<td>Subway (km):</td>
<td>291</td>
<td>402</td>
<td>368</td>
<td>214</td>
<td>456</td>
</tr>
</tbody>
</table>

The Challenges
The current subway capacity serving functional areas is full.

But job density, land value and development of Beijing CBD and financial street is relatively low.

The functional areas will be more congregated.

### The Challenges

Increase subway capacity in downtown functional areas.

<table>
<thead>
<tr>
<th></th>
<th>Unit</th>
<th>Beijing CBD</th>
<th>London CBD</th>
<th>Tokyo</th>
<th>Manhattan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td>Km²</td>
<td>4</td>
<td>2.6</td>
<td>1.2</td>
<td>1.3</td>
</tr>
<tr>
<td>Plot Ratio</td>
<td>6</td>
<td>10</td>
<td>15</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Job density</td>
<td>10000 person/km²</td>
<td>5</td>
<td>12</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Land value</td>
<td>100 mln/km²</td>
<td>11</td>
<td>61</td>
<td>93</td>
<td>110</td>
</tr>
<tr>
<td>Subway</td>
<td></td>
<td>2 (4)</td>
<td>8</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Rail</td>
<td></td>
<td>0</td>
<td>3</td>
<td>11</td>
<td>4</td>
</tr>
</tbody>
</table>
Moreover, road rights of ground bus can’t be guaranteed. Transmission service is needed.

- The bus lane network is yet to be formed, which affects the speed and punctuality, and makes it hard to attract car-owners.
- Because of the fixed ticket price, there’s no transmission service between regular bus service and other vehicles.

80% interviewees say “willing to abort cars and choose bus if it’s comfortable, even if the price would be higher than now”

<table>
<thead>
<tr>
<th>City</th>
<th>Ground public transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beijing</td>
<td>Regular bus</td>
</tr>
<tr>
<td>Singapore</td>
<td>High-end bus, regular bus</td>
</tr>
<tr>
<td>HK</td>
<td>Patent bus</td>
</tr>
<tr>
<td></td>
<td>Public bus</td>
</tr>
</tbody>
</table>
After 10 years of construction, the loans of rails, highway and regular roads are close to 270 billion yuan. The government has enter the peak period for loan payment.

The government has given over 15 billion yuan of subsidy because of under-priced tickets.

Low social investment because of lack of profit models.

More huge investment still needed for large-scale infrastructure building.

- Maintenance and renovation cost will soon replace building cost.
- Huge operation cost will become a common challenge for city development.
Beijing transport faces huge challenge of expanding financing channels and building profit model, so that despite the high building and operation cost, its system can still support the city’s sustainable development.

Global experience shows that the core of profit model lies in breakthrough of land using rights.

- **Tokyo**: Agree to commercial development of transport land.
- **HONGKONG**: Use special license so that subway companies enjoys property development rights along the lines.
- **Singapore**: Save and control lands around stations. Government will sell and profit when time’s right and then reinvest the gains into the rail system.
- **Shenzhen**: Learning from Hongkong and exploring the “subway+property” model.
Despite the rapid mechanization, the traffic awareness, and safety education are left behind. The modern transport civilization is yet to be built.

- **Transport awareness:** dream of owning and using cars despite the resource press. Think that government must provide parking space.
- **Traffic ideology:** It’s a shame to not having or driving a car.
- **Road manner:** Force to merge, running red lights, etc.
Road civility incomparable to other world cities
No bases for scientific management

- Can’t give up the American dream of everyone owning a car
- Globally accepted traffic regulations not very well received in China
- Not used to pay for the huge social cost of owning a car
- Cost of breaking the law is low

Mechanization needs high traffic civilization to go along. The government need to enhance communication with the public and grow together.

Japan:
Ideas widely accepted in 1970s:
- Prepare for your own parking space, do not take up public space.
- Commune in private cars is a luxury and compromise public interests.
- “No private cars for commune” widely accepted

Singapore:
- Teach kids of road civility
- Promote community member to take part in traffic related issues
Outline

1. Current situation
2. New situation & Challenges
3. Thinking Beyond
1. Enhance the supply capacity of rail transportation, expand Suburban Railway

（1）Enhance suburban rail construction and finish rail system to connect downtown, new towns and cities in neighboring provinces.

（2）Based on the current rail transport plan:

• **Intensify downtown network**: Focuses on CBD, financial street and other functional areas. Increase entrances.

• **Expand key rail corridor**: Build fast lane, parallel lines.
2. integrated transport hub with integrated urban development

Renovate hub areas: Adjust land functions and development around transport hubs, increase entrances of nearby buildings

• adjust regulations to arrange development in line with its plot ratio

• Co-develop urban rail lines, suburban railways and lands along the lines.
3. Build a rapid and diversified public transport system

Accelerate rail transport building, optimize ground bus network, and:

（1）Road priority: Adjust bus lane planning methods, and make room for bus lane in congested areas.

（2）Multiple choices of public transport:

• Open community bus lines, and mini buses to connect subway stations and bus stations
• Open business bus to provide more convenient and comfortable service to attract private car owners

（3）Research of price reform: adjust prices based on the nature of public welfare. Form an efficient and diversified price system to coordinate rail system and bus system.
4, Reduce the car into the city center and the use of cars in center city

Emphasize on total car number control, keep implement peak hour staggered traffic control, and:

（1）Parking regulation in downtown: constriction & management, Law enforcement, pilot program & publicity campaign

（2）Private car number regulation: Implement traffic and environmental capacity constraints to control total motor vehicle number.

（3）Study of using economic measures to control the car demand, reduce the car use
5. Establish a government guided transport infrastructure investment and financing system

➢ Build a stable investment insurance system.

➢ Learn from other countries, start with rail transport, highway and parking facilities to find the right profit model. Absorb social investment through market practice.

➢ Study the co-development of transport infrastructure and commercial development.

➢ Raise funds for roads and transportation hub building. The main sources should be government subsidy, and then market financing.
6, The government strengthen communication with the public, enhance public awareness of modern transportation

- Build benign public relations between the government the public. The government should lead and demonstrate how to use integrated transport, and enhance communication, and create a good social environment to promote road civility.

- Pay attentions to child education.

- Understand social expectations. Let the public learn the universal measures, the actual problems, as well government’s efforts.

- Promote grass-root stake-holders to participate in transport affairs management by arranging community activities, exhibitions and hand out publishing materials.
Thanks!