



PKU

BRT Program of Bell Course in PKU

# The Report on BRT and Case Study of Beijing

Sustainable Transit Program

Deng Bing

Ge Xiaodong

Gao Liang

Li Dong

Kang Dawei

Wu Ning

Yao Wei

Xu Haiping

Zhang Jing



## Index

- The traffic status of BeiJing
- Characters of BRT
- Technology & Economy Advances of BRT
- Existing BRT in Beijing
- Extend and Popularize BRT in Beijing
- Conclusion



## Index

# ■ The traffic status of Beijing

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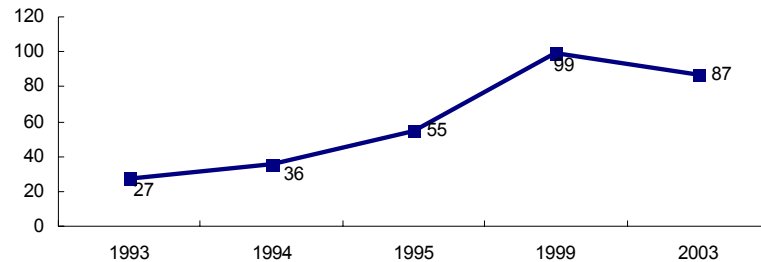
# Congestion in BeiJing

1. Sections of Congestion

2. Speed of car

3. Average load of road

sections of traffic jam in beijing





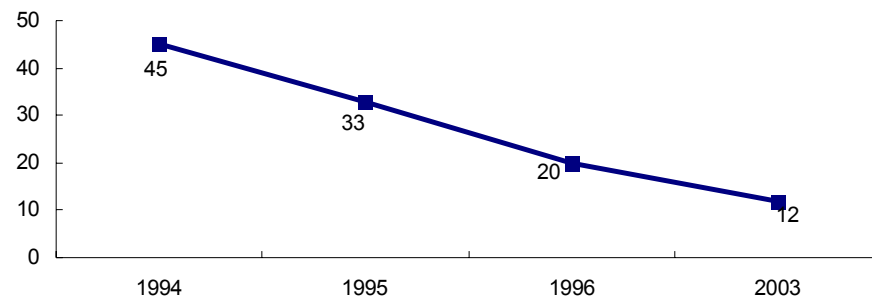
# Congestion in BeiJing

## 1. Sections of Congestion

## 2. Speed of cars

## 3. Average load of road

the speed of cars in beijing





# Congestion in BeiJing

1. Sections of Congestion

2. Speed of cars

3. Average load of road



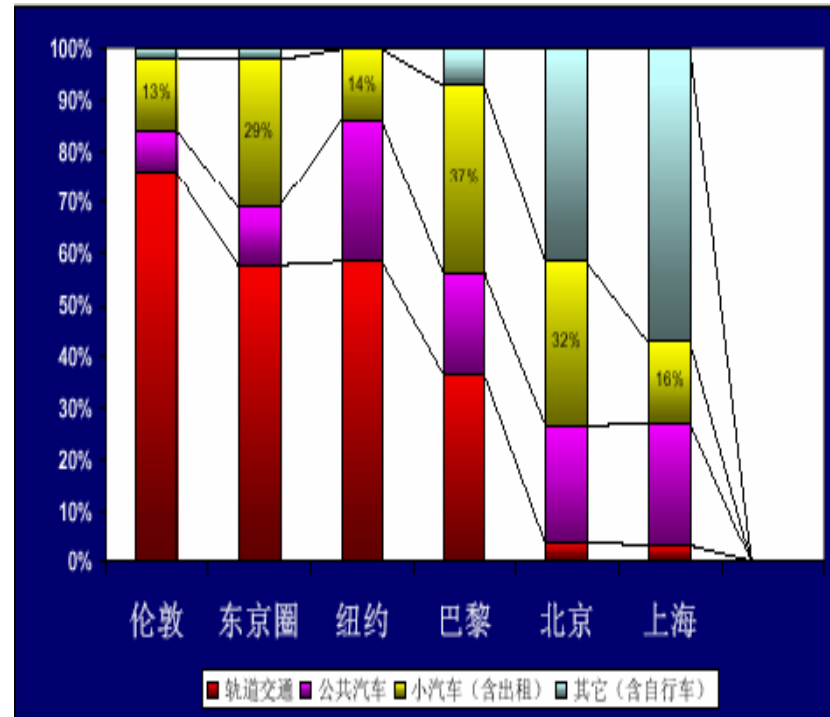
Today, the average load of road has reached 90% in peak time, the speed of cars can't reach 20 m/h in some roads of incity.



## public traffic of BeiJing

The Percentage of public traffic is poorly low

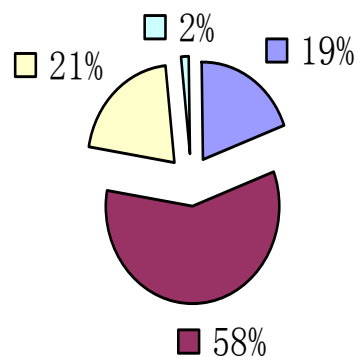
60 %~80 % commuting is public traffic in big cities of Europe and USA, while 30% in BeiJing.





# Principle of Users' Choice: Convenient, Fast and Economical

## Characters of Ideal Civil Transport System



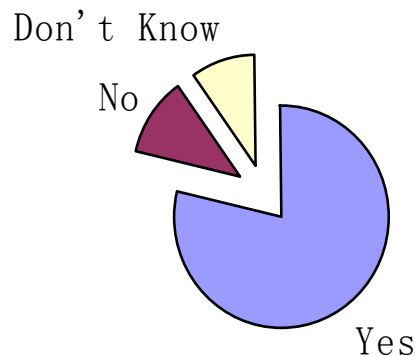
- Cheap
- Fast and On time
- Easy to Change Other Vehicles
- Other





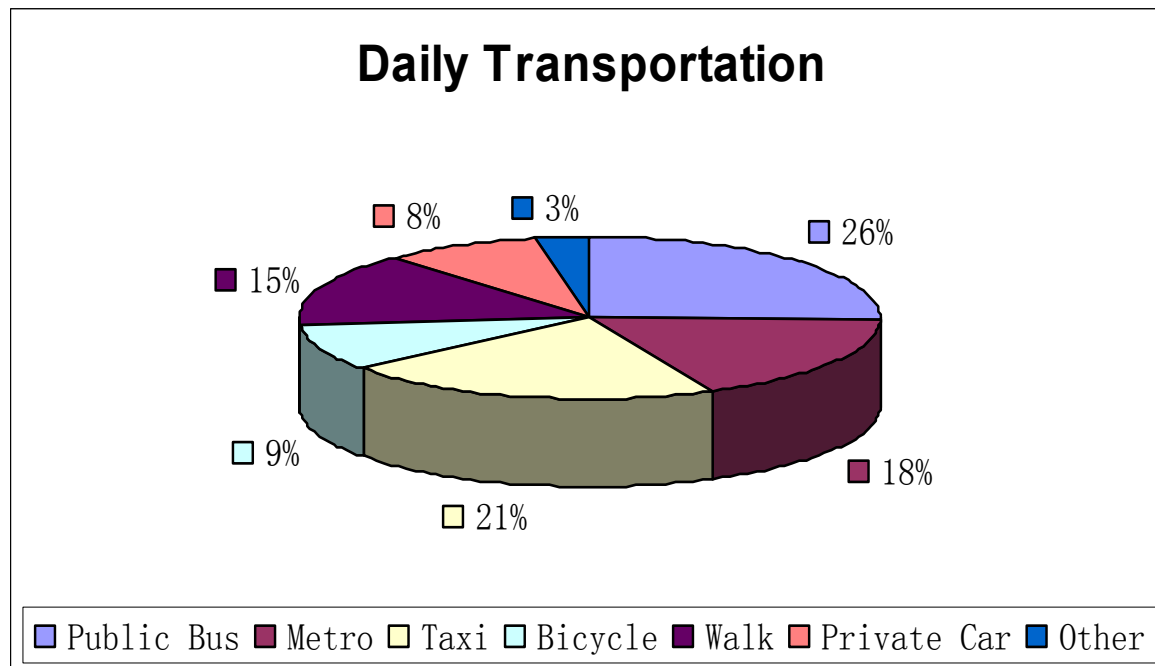
## Principle of Users' Choice: Convenient, Fast and Economical

**Would you like to pay more for a more  
convenient and faster system?**





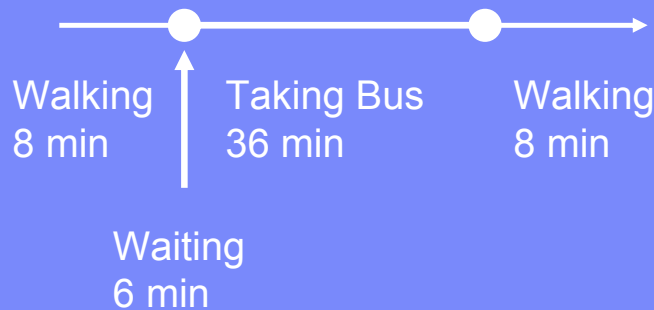
# Principle of Users' Choice: Convenient, Fast and Economical



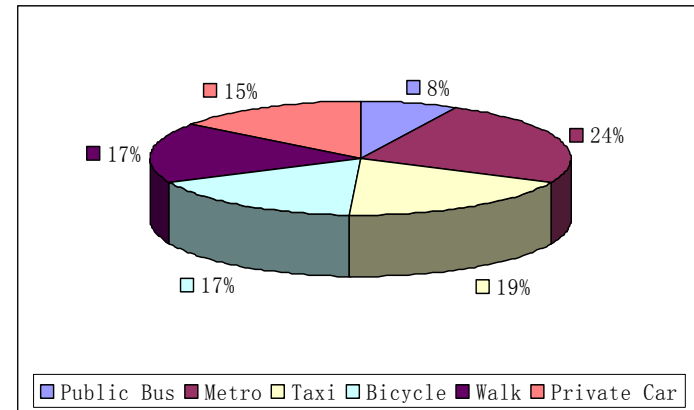


# Results of Our Survey

**Timing Compare**  
**In bus / Out of bus = 6 / 4**



## Acceptance of Vehicles



- The size of Metro and Light Rail is small and can only afford 5% of total traveling.
- Network of bus is deficient and accessibility of sub-network is limited.
- Not easy to change among different vehicles. The average distance of changing is 350m more and 16% of passengers have to walk 1km more before changing.
- The average time of taking a bus is 58 min.



## Index

- The traffic status of Beijing

## ■ Characters of BRT

- Technology & Economy Advances of BRT
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# BRT



High Capacity Bus Systems、 High Quality Bus Systems、 Metro Bus、 Rapid Bus、 Busway Systems, etc.

“ground subway”



## History of BRT

- Cradle of BRT: Latin America
- Concept of BRT: the final aim of public traffic system is not to transport **vehicles** but **people**, *quickly effectively and economically*
- Aim of BRT: Bus Rapid Transit is high- quality, **customer- orientated** transit that delivers *fast, comfortable and low-cost* urban mobility.



A convenient and quick public traffic mode utilizing *improved buses*, running on *the segregated busways*, keeping *the characteristic of rail traffic* and possessing *the agility of regular bus*.



## Characters of BRT

hardware

busway, bus, station, fare, etc.

software

management, run, ITS, etc.

connotation

customer- orientated, social justice

symbol

modern city, green life





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- Characters of BRT
- **Technology & Economy  
Advances of BRT**
- Existing BRT in Beijing
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## Technological characteristics of BRT system

- **Segregated Roadway**
- **Flexible Line**
- **Comfortable Station**
- **Special Vehicle**
- **Convenient Fare Collection**



## Segregated Roadway



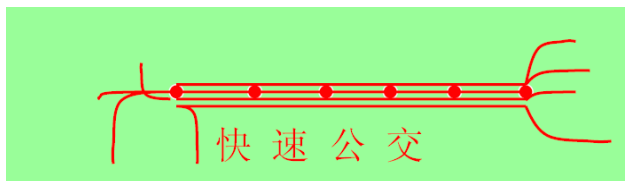
- Special Roadway for public traffic

Roadway Style: special busway in the center of road; converse busway, absolute bus road and bus tunnel  
Different choice in different area

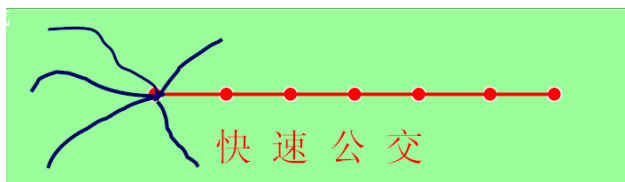
Width of roadway: 11-12 feet (3.30-3.75meters)  
Broadened to 50feet(15 meters) in stations to ensure overtaking



# Flexible Line



BRT system can have both uniform line and mixed line, just as rail system



Design of BRT line depends on the local conditions (Transit-Oriented Development)



# Comfortable Station

Semi-Closed



Location: near main intersections and centralized areas  
Convenient transfer with spur track

Space between stations: generally 600–2200 meters, and depended on lengths of stations and vehicles

Capability of overtaking: Roadway is broadened from two to four thus can ensure the overtaking

Passenger assistant establishment: comfortable transfer establishment, elevator and walking way



## Special Vehicle

- Characteristics: improved vehicles of fresh and uniform appearance
- Velocity and capacity: double gemel vehicle (18.5 meters), 20kilometers/h, 270 person/vehicle , 4000 person/d, four times as common bus
- Power: clear ;low-floor bus





# Convenient Fare Collection



**Fare Collection:** pre-pay system

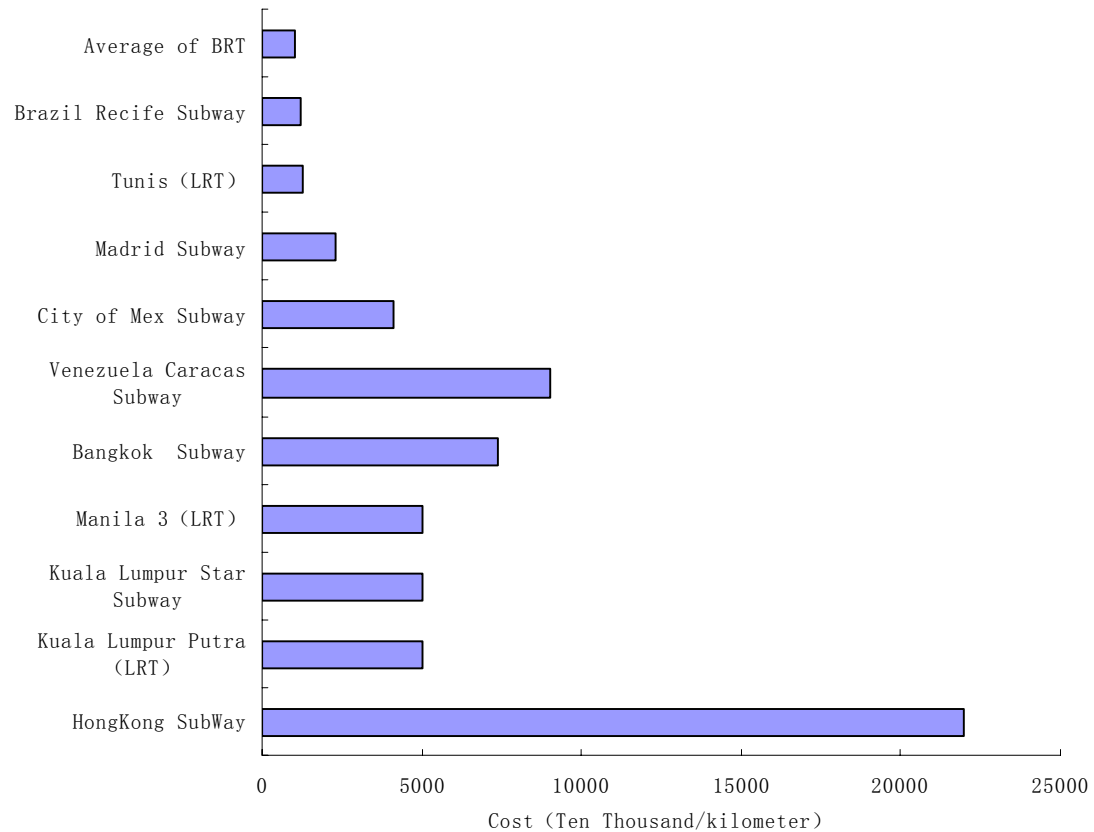
Main fare collection: smart-card technology, proof-of-payment system, ticket-less system

**Fare mechanism:**

uniform fare versus distance-based fares  
IC 80% discount



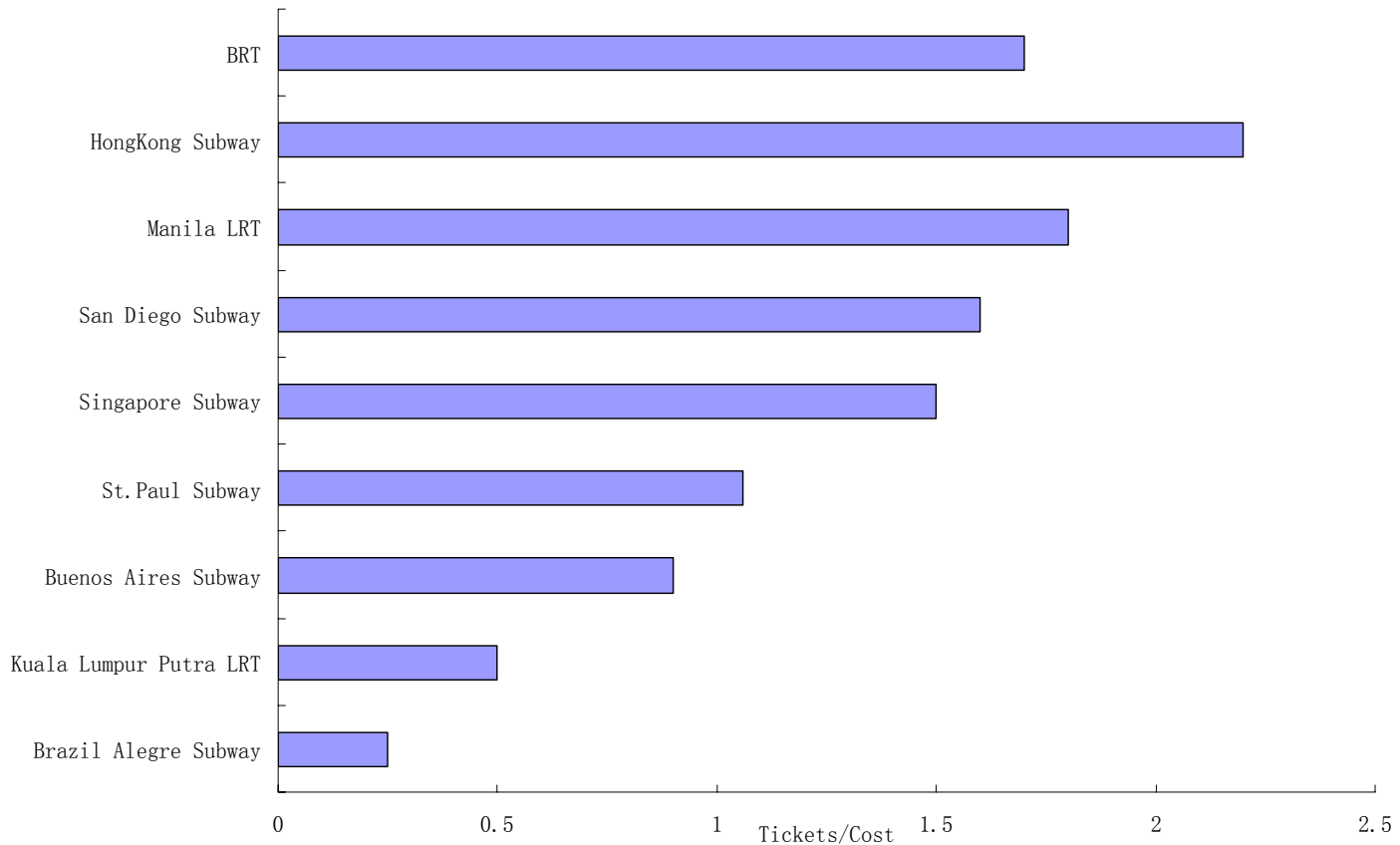
# Lowest Cost Of Capital Construction







# Better Ratio Of Tickets Benefit To Cost





## Superiority Of BRT

- **Lower cost than other vehicles**
- **Shorter Construction Period  
(BRT<18months, Subway>3 years)**
- **Higher benefit ratio from tickets**
- **Agile**
- **of great carry capacity**
- **High ratio between performance to price, a good substitution to other vehicles, especially for private cars**



# OPERATION AND MANAGEMENT OF BRT SYSTEM

## Foreign Experience

State-owned company is in charge of the daily operation with participation of private companies in Curitiba Brazil.

## Situation in Beijing

Beijing Public Transportation Corporation will establish separate company to operate and manage the BRT System.

## Financing Channel

Government Support; Civilian capital financed by Beijing Public Transportation Corporation and other transportation companies.



# ROAD PRIORITY OF BRT SYSTEM

To be real “Public Transit Priority”: Public Transit Signal Priority Technique”; Accommodation Road.

Public quality: Roads in Beijing need physical isolation.

Methods of Nanzhongzhou Road: Viaduct; Utilizing of Green Belt in the middle of the road



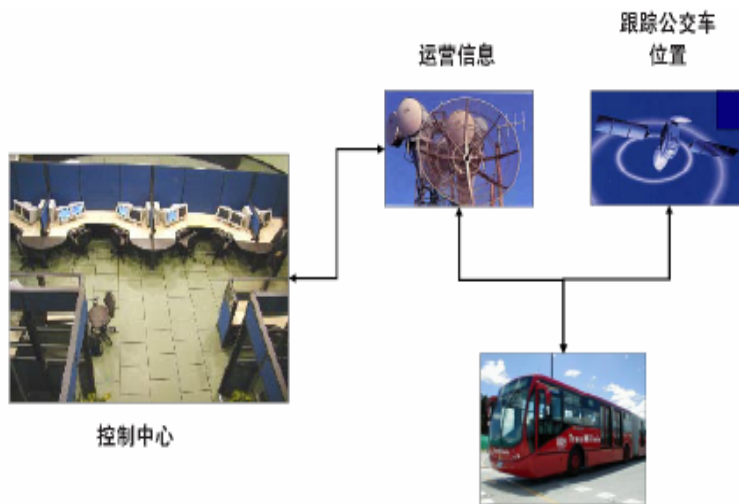
# Segregated Roadway

## THE EFFECT OF ACCORMODATION ROAD





# ITS used in BRT



- Automatic Vehicle Location
- Passengers Information System
- Public Transit Signal Priority
- Automatic Transit System showing the location and status of buses simultaneously can improve the security of the system



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## Cases of BRT application in Beijing

A mini BRT route from Tsinghua University to Beijing Palestra University

An abuilding BRT project on the Nanzhongzhou Route





## A mini BRT route from Tsinghua University to Beijing Palestra University





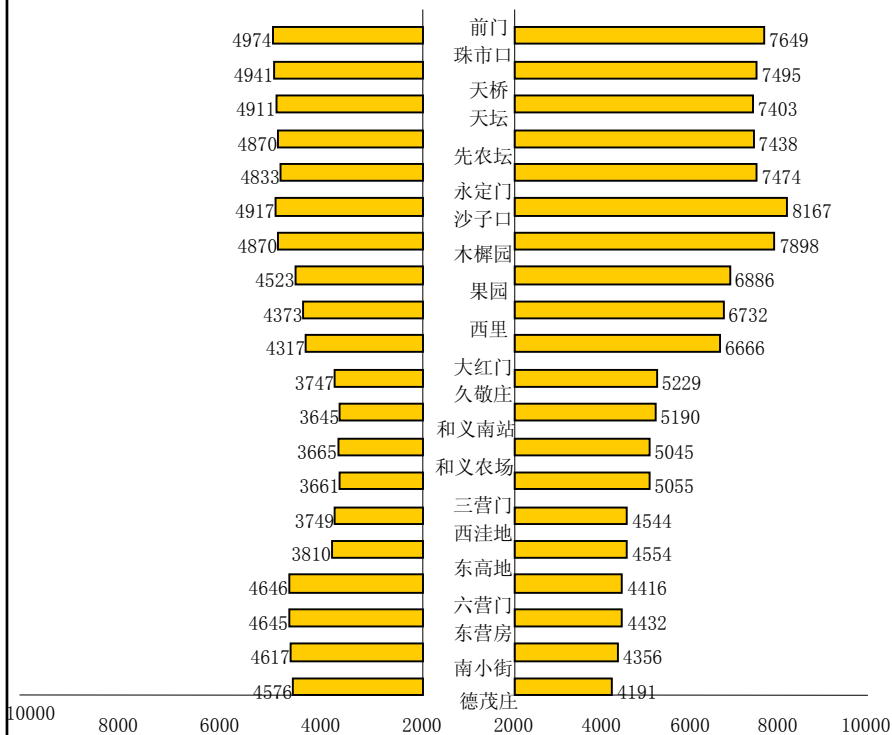
## A mini BRT route from Tsinghua University to Beijing Palestra University







# Survey of the abuilding BRT project on Nanzhongzhou line • The flux of passenger



**There are 31 bus line crossing Nanzhongzhou line.**

**The amount of passenger transport is 316,000 people per day.**

**The maximum amount of passenger transport**



# Survey of the abuilding BRT project on Nonzhongzhou line • flux of passenger forecast

item	Short term (2005)	Middle term (2009)	Long term (2014)
Flux of transport at cross section in rush hour (people per hour)	3000	8000	12000
Amount of passenger transport (people per day)	100000	150000	210000
Minimum interval of two buses (min)	3	2	1.5



## Survey of the rebuilding BRT project on Nanzhongzhou line

- adjust routes, relieve transport congestion

items	routes	The amount of buses equipped	Buses of the whole day on the line
Routes can be recalled	54	15	230
	341	35	108
	742	82	816
Routes can be adjusted	729	83	576
	859	62	368
	926	20	160
Terminal routes of “Qianmen” can be recalled	5	40	783
	9	47	678
	53	26	481
	59	24	403
Sum total	10	434	4603

After BRT project put into practice, 3 routes can be recalled, 3 routes can be adjusted, 4 terminal routes of “Qianmen” can be recalled, and 434 buses can be quitted.



# Fieldwork of the BRT project on Nanzhongzhou route

Demao Village-Donggao



Donggao-Three Gates





# Survey of the abuilding BRT project on Nanzhongzhou line

- Bus chosen for BRT

18-25 meter long

CJ6180GCH(K) 城市客车



item	18-25 meter long
Standard of underpan	Low
door	Open on the left
capacity	About 250 people
Key equipment	import
emission control regulations	European III
manufacturer	Changzhou Yiweike car corporation
Delivery date	Dec,2004





# Survey of the abuilding BRT project on Nanzhongzhou line

- Bus Station

Half closed shape



**Side stations will be used on the “Qianmen” “Tiantan” “Yongding” station.**

Total closed shape



**Island station will be used in the middle of the route.**



# Survey of the abuilding BRT project on Nanzhongzhou line

- Charge Patternz

if you use a IC card, you can get 80% discount





# Survey of the building BRT project on Nanzhongzhou line

- Investment and Share

- **Total: Over 6,000 Million RMB**
- **Invest by government: about 60%,** Used to build road、 bridge and some of stations
- **financing from market: about 40%,** Used to purchase bus、 intellectualized equipment and bulid some of stations



# Survey of the abuilding BRT project on Nanzhongzhou line

- Construction Spot





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## Contents:

- Destination
- Image
- Publicity



## Destination

### Independent BRT

Main body of public transportation

Together with the subway and the light railway

Extension of the subway and the light railway

Transition of the subway and the light railway



# Aim

**Together with the subway  
and the light railway**





# Image

We try to shape a new transportation mode with brilliant colors as followed:

- Convenient

- Green

- Fashionable





Convenient

Green

Fashionable

### Design for the special ones



•The design of the low floor and the ramp have paid more attention to the old and the physical disabled.

•The transport establishment in Beijing is not so convenient for the physical disabled. Such as the high floor of the bus, the occupation of the roads for blind

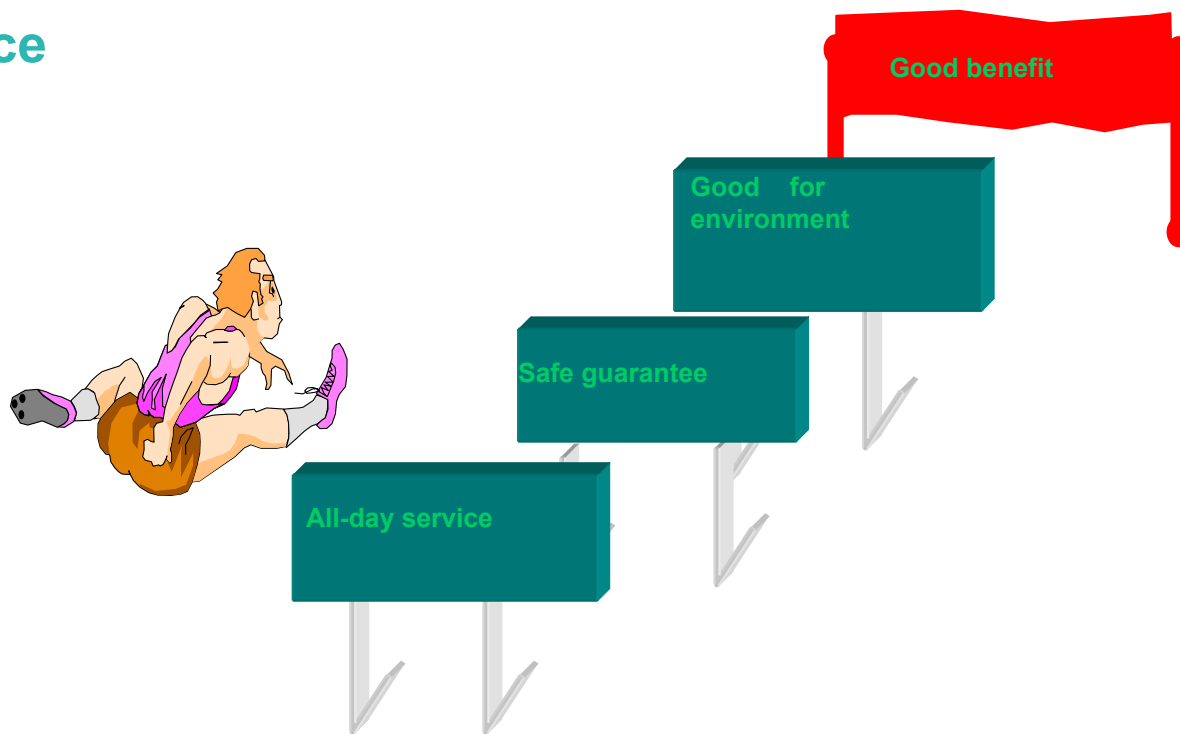


Convenient

Green

Fashionable

Service



BRT Program of Bell Course in PKU

Convenient

Green

fashionable



**Excellent Service**

- Better than the traditional bus system. The service of busman give the first impression to the passengers .

**Design of the station**

- Providing drinks, newspaper etc .for the passengers .

**ITS**

- The passengers will know when the bus will come, so they can manage the waiting time freely.



Convenient

Green

Fashionable

- Considering for the environment when choose the buses
  - *Fuel battery Clean diesel oil Mix battery*
  - *Electrical bus Natural gas*
- Handling of the bus washed out:
  - *Propagandizing bus for community education*
  - *Export to other cities.*
- Placing environment quality report in bus or the station
  - *Made the public attach importance to the environment.*





Convenient

Green

Fashionable

- Enhancing the city figure
- Surging the fashionable tide to take BRT
- New culture element



# Publicity

- Poster ad. in subway
- Publicity on TV
- Survey



Promotion logo



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## Conclusion

- The serious congestion in Beijing makes it the rule to select transit pattern to be **Convenient, Fast and Economical**.
- BRT meets the requirements of GOVERNMENT and the PUBLIC, through its **advantages on technology, economy and policy**.
- BRT's intelligent and environment-friendly design may bring out social and environmental benefits, therefore **promoting Beijing's feature as China's Capital**.



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