

Thinkings and Suggestions for Public Transport Development in Chinese Cities

Name of author:

FENG Liguang, JIANG Yulin, PENG Hu, WU Hongyang

CoE affiliation:

China Urban Sustainable Transport Research Centre (CUSTReC)

China Academy of Transportation Sciences (CATS)

Ministry of Transport (MOT)

240 Huixinli, Chaoyang District, Beijing, P. R. China, 100029

Telephone: +86-10-58278509

Fax: +86-10-64964252

E-mail details:

feng.liquang@163.com

Short biography:

Mr. FENG Liguang holds a Master Degree of Transport Engineering. His research focuses on the policy and planning study for urban transport development, and transport demand management. He once participated in the project of Road and Waterway Transport Development Strategy in Guizhou Province, Strategy and Policy for Sustainable Transport development in China and Transport Demand Management policy Study. With 10 articles on domestic and international journals, Feng is also a primary contributor to the series of books: Experiences of Sustainable Transportation Development in Foreign Countries.

Abstract:

This report adopts SWOT analysis method for a systematic analysis and research of achievements, problems, challenges and opportunities of Chinese urban public transport development. It summarizes main features and evaluates the development conditions of the supply level, hardware environment etc of public transport; Through longitudinal and transverse comparison, it carries out systematic analysis for existing major problems of current public transport development, and defines the major obstacles that restrict healthy development of public transport in aspects of institutional system, mechanism, laws and regulations etc; Next, in combination with macro environment and new situation of national social and economic development, it analyzes opportunities and challenges of urban public transport development; Finally, with respect to the existing problems, policy suggestions to promote sustainable development of urban public transport in the new period as

reference for government departments to strengthen decision-making of public transport management were put forward.

1. Background

Along with the very rapid development of economy, urbanization and motorization in China during recent years, the urban transport system is confronting significant challenges, such as traffic congestion, environmental pollution and energy shortage, etc., which greatly depress living quality of residents. Studies show that pollutants from vehicle emission contribute about 60% of the total urban air pollution in China. In 2005, Chinese oil consumption amounted to 300 million tons, whereas motor vehicle took 33% of that amount. Traffic congestion has also become a big problem in Chinese cities. It is reported that Shanghai suffered a GDP loss of 10% by traffic congestion.

Rapid increase of traffic volume and high quality transport service requirements will be generated by the fast development of Chinese economy. It is very important for China to realize sustainable development of urban transport in the coming 10 years. It is of great significance to formulate scientific and reasonable strategies and policies to guide China's public transport development by taking full consideration of the rapid urbanization and motorization.

2. Current status of urban public transport development

2.1 The concept of public transport priority is accepted gradually

In recent years, Chinese central government issued many policies to promote public transport development, and continuously intensified investment in public transport. Strategic thinking of Public Transport Priority is welcomed and supported by the general public.

Beijing has issued *Opinions on the Development of Public Transport Priority in 2006*, and determined the strategy of **Two Determinations and Four Priorities**. **Two Determinations** is to determine the strategic position of public transport in the city development, and determine social public welfare orientation of public transport; **Four Priorities** refer to land priority for public transport facilities, priority for infrastructure investment, priority for right-of-way allocation, and priority for finance and taxation support. At present, urban public transport system has been basically formed in Beijing, with mass transit as the backbone, conventional public transport as the main body, and multiple transport mode as the supplement.

Action Plan of Shanghai for Public Transport Priority Development in Three Years From 2007 to 2009 decided to invest funds above 110 billion CNY to quicken the construction of mass transit and comprehensive transport transfer junction infrastructures from 2007 to 2009, so as to promote sound progress of public transport. By the end of 2007, Shanghai has opened 991 public

transport lines, 16,944 operating vehicles, and 48,600 taxis. Public passenger transport volume in the whole city reached 12.7 million person-times/day, and its share in the total travel structure reached 26.5%.

2.2 Public transport infrastructure has been improved

In recent years, the Chinese government has increased investment in urban public transport. The total investment in urban public transport system reached 60.4 billion Yuan all over China in 2006, increased by 68% since 2003, see Fig. 1. With the increase of investment, public transport operation environment has been improved continuously, and serviceability is enhanced notably.

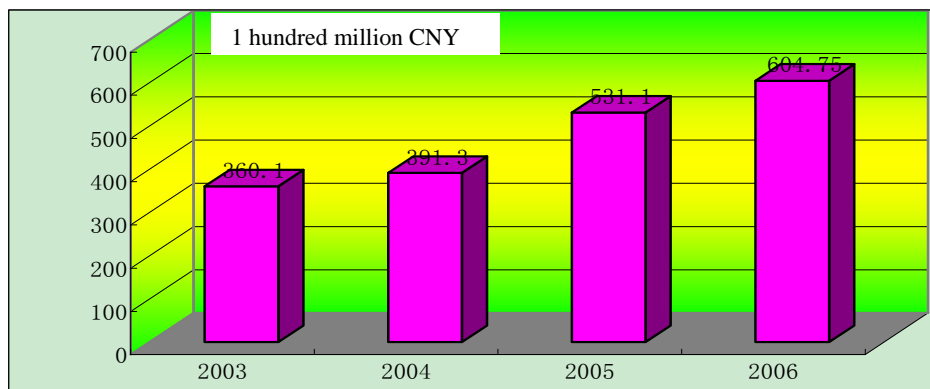


Fig. 1 Public Transport Investment in Chinese Cities

2.2.1 Routes and equipments

By the end of 2006, there were 312,800 operating buses and trolleys in China, increased 38.44% since 2000. Every ten thousand persons possess 10.1 standard vehicles, increased by 66% since 2001, and city taxis, 928,600, increased by 12.57% since 2000. The total length of bus, trolley line network is 143,700 km, increased by 50.0% since 2000. See Fig. 2

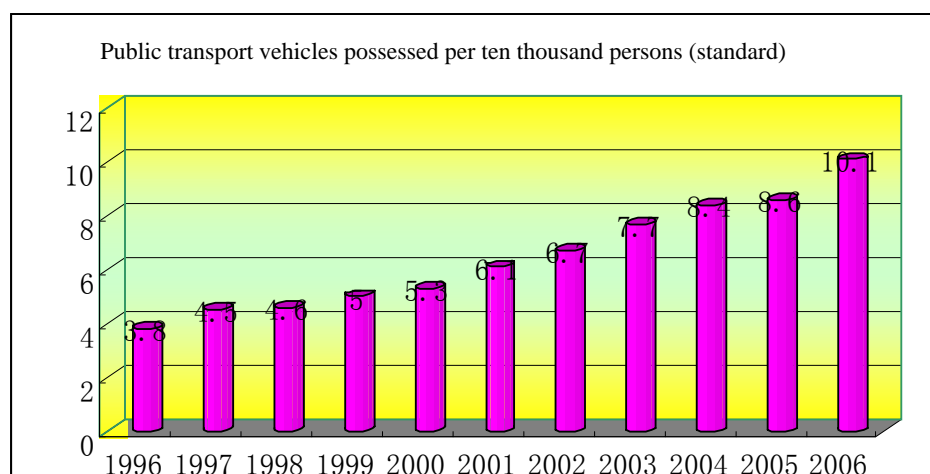


Fig. 2 Development of Urban Public Transport Vehicles in China

2.2.2 Urban rail transit

By the end of 2007, 30 urban rail lines were in operation in ten Chinese cities,

with total distance of 729 km (including magnetic suspension). It is anticipated that about 1500 km rail transit will be constructed during the “Eleventh Five-Year Plan” in China, total investment amount to 400-500 billion CNY. In 2006, passenger transport capacity of urban rail transit reached 1.82 billion person-times, with the share of the total travel structure increased from 2.38% in 2001 to 3.90% in 2006.

2.2.3 Bus Rapid Transit (BRT) and dedicated bus lane

On Dec. 30, 2005, the first Bus Rapid Transit (BRT) line in China---Beijing South Central Axis BRT #1 Line was put into operation. Later on, BRT system has been developed rapidly in many Chinese cities. As for 2008, 16 BRT lines were put into operation in ten Chinese cities, and the total operating distance now is 283.8 km. According to prediction of the Ministry of Construction, by 2015, BRT lines will reach 500 km in China. By the end of 2007, more than 1300 dedicated bus lanes were available in more than 230 Chinese cities, with total length of more than ten thousand kilometers.

2.3 Notable increase of urban public transport service level

With the improvement of hardware, the service ability and quality of public transport has also increased continuously. The unattended ticketing system and transport IC card are popularized rapidly, nonlocal networking intercommunication of public transport IC card is realized. In some cities of Yangtze River Delta. GPS, GIS etc intelligent operating management technologies are used extensively. In addition, construction of public transport obstacle-free facilities is quickened gradually to meet transfer requirement of the disabled etc vulnerable groups greatly.

In 2007, daily average passenger transport capacity of ground public transport in Beijing reached 11.48 million person-times, increased by 17% over the preceding year; travel share of public transport reached 34.5%, increased by 4.5% than the preceding year. Average operation speed of ground public transport was 15.2 km/h, increased by 8.6% since 2003. At present, Beijing municipal transport card has realized unified settlement and use at public transport, metro, parking lot, taxi, supermarket, IC card telephone etc utilities. From fully open on May 10, 2006 to Dec. 10, 2007, totally 14,634,500 cards were issued, 11 million daily average transactions per day.

Shanghai City launched a preferential policy for public transport transfer, namely, a passenger may enjoy preferential 0.50 Yuan when he uses the transport IC card again to take public transport vehicle within one and a half hours. At present, 73 preferential transfer lines are open in the urban area, nearly 60,000 person-times could enjoy the preferential every day.

3. Existing problems in urban public transport development

3.1 Overall supply and service quality of public transport lag behind

Compared with foreign developed countries, service level of urban public transport is low in China. In the transport structure of Chinese cities, public transport travel share is about 10% - 35%, far lower than the average level of similar scale cities in developed countries, see Fig. 3. Average operation speed of urban public transport is merely 10 km/h, even lower than that of bicycle. In addition, long waiting time, inconvenient transfer, low punctuality rate etc further reduce the attraction of public transport to the public, and stimulates car usage. With limited road resource occupied by individual transport, traffic congestion is rapidly spreading, and further deteriorates public transport environment, which forms a vicious circle.

For example, although Beijing adopts many measures such as lowering ticket price, and optimizing line network etc, the bus service has not changed fundamentally. The major reason is low operating speed of ground public transport and long time consumption. The average bus travel time is 62 minutes, of which waiting time is 8.6 minutes, and walking, 15 minutes. See Fig. 4.

“2008 Foton Chinese Index for Mobility” released jointly by Beiqi Foton Company and Horizon Research Group, Inc. Shows that, jam cost to and from work is 375 Yuan per capita per month in Beijing City, ranked the first in China; Guangzhou is ranked the second, 274 Yuan per month; Shanghai is ranked the third, 228 Yuan per month; Xi’an City has the lowest jam cost, 69 Yuan per month.

Average transfer distance in public transport system was above 350m in **Beijing City in 2004**, of which 16% of passenger transfer distance exceeds 1 km, above 30% of transfer distance exceeds 500 m, walking time of passengers on both terminals is 7.9 minutes and 8.4 minute respectively.

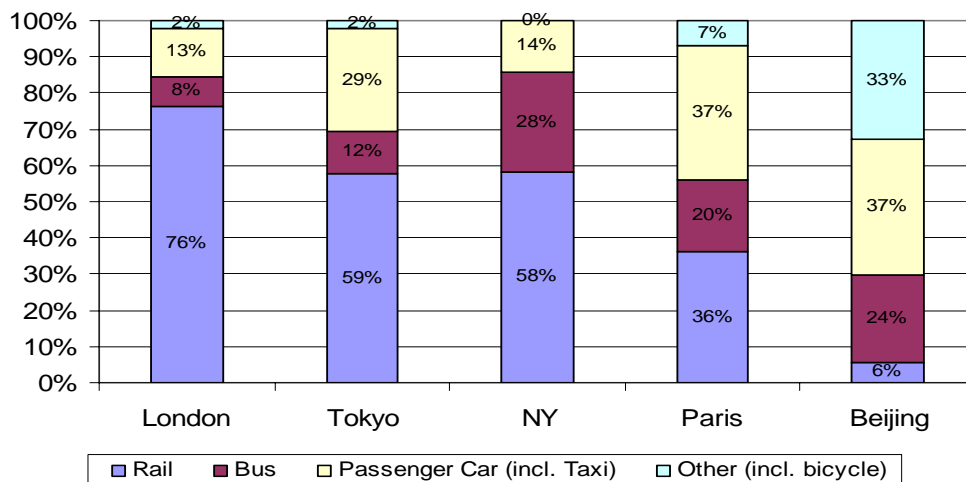


Fig. 3 Comparison of Transport Structure in International Cities

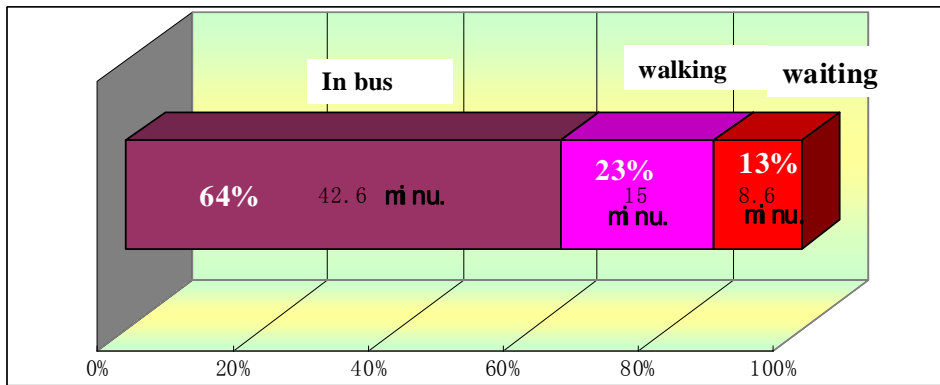


Fig. 4 Composition of Ground Public Transport Time in Beijing

3.2 Insufficient input of urban public transport funds

3.2.1 Overall investment of public transport is insufficient

Problems such as weak guidance on the investment policy, historical debts, a single channel of fund resources for public transport exist in the Chinese public transport system for a long time. At present, sources for urban public transport construction and government subsidies completely come from local finance, lack of supplement from funds or stipulated transport fees. In 2006, the national urban construction investment in the fixed assets was totally 576.51 billion CNY, of which urban public transport investment in the fixed assets accounted for 10.47%, and road bridge investment accounted for 52.03%, as shown in Fig. 5. From 2000 to 2006, increase of public transport buses and trolleys was far below the increase of private passenger transport vehicles, and such gap shows expansion trends year after year, see Fig. 6.

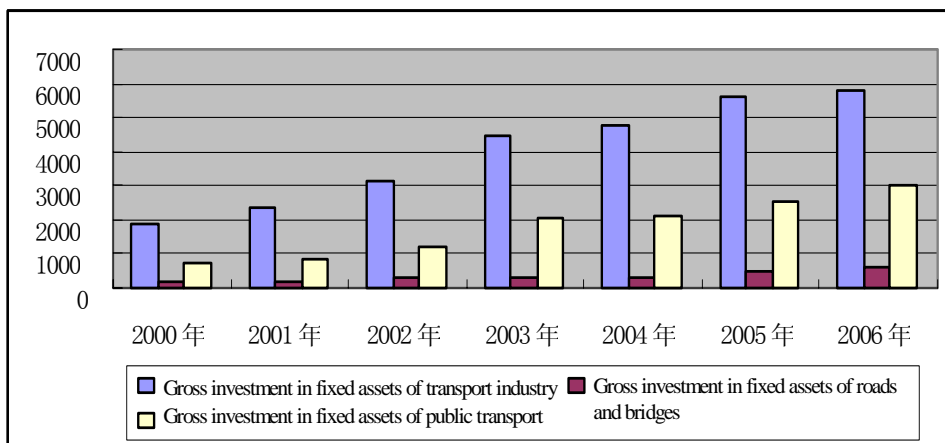


Fig. 5 Chinese Urban Transport Investment Structure in the Past Years

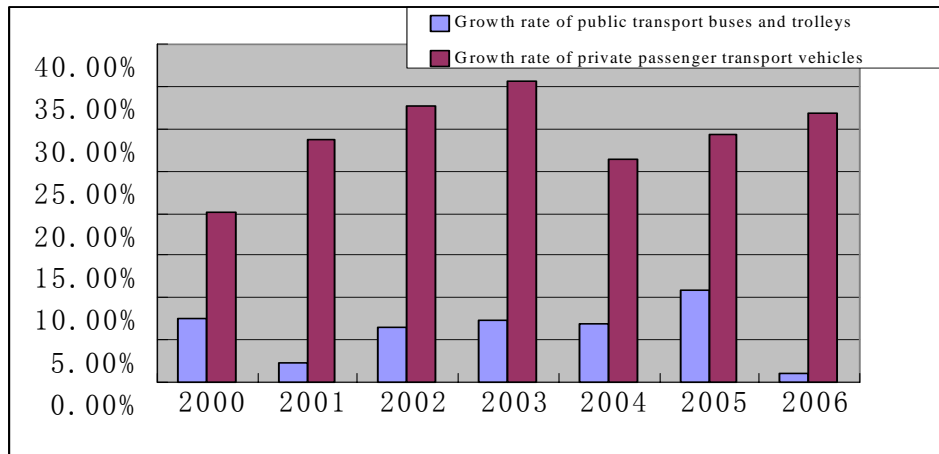


Fig. 6 Growth Rate of Public Transport Vehicles Vs Private cars

3.2.2 Lack of scientific and stable public transport subsidy mechanism

(1) The scope of government subsidies is not defined clearly

Many administrative deficit items are not included in the subsidies scope (for example, new bus routes, bus routes to townships and villages, vehicle update compulsorily required by the government, preferential student ticket price, etc). So the burden of the enterprises becomes too heavy. At the same time, it cannot be ensured that subsidies be used in the bus routes and those enterprises which need the subsidies most, and a special style of waiting, relying and soliciting within public transport companies has been created.

(2) Lack of scientific accounting mechanism for the amount of subsidies

A normalized measurement and calculation mode for public transport subsidies has not been developed yet in most Chinese cities. The amount of policy-based loss subsidies for public transport are determined through bargaining between the government and public transport enterprises for quite a few cities. Sometimes electronic ticketing is not fully realized, and the operating revenue is not transparent. The cost of the public transport enterprises is not divided as per route, many cross overlappings exist in the consumption of vehicle, fuel, labor force etc resources, so it is very difficult to calculate and examine separately and difficult to determine the limit of subsidies.

3.3 Urban public transport institutional system is not adaptive

Currently in China, various transport modes (highway waterway, railway, civil aviation, pipe etc.) are managed by different government departments, which separately plan and construct their own infrastructure networks, with weak connection and coordination. This hinders the construction progress of modern comprehensive transport system severely. Within the city, planning, construction, operation etc works of urban public transport are managed by different government departments separately, namely, transport, planning, development and reform commission, land and construction etc. Unsmooth communication between them leads to disconnection of public transport development links. For example, because of insufficient communication at

early stage of planning and construction, in many cases, the newly constructed road has to be reconstructed to supply the public transport facilities.

In Chongqing, Municipal Development and Reform Commission is responsible for coordination and preparation of comprehensive transport planning of the whole city; Municipal Planning Bureau is responsible for (assisted by Municipal Construction Committee) planning of urban roads and mass transit as well as coordination of comprehensive transport planning within main urban area; Municipal Transport Committee is responsible for planning of highway, waterway transport, planning of city bus transport, public transport stations for the whole city. Due to ununited planning, connectivity between mass transit stations and public transport stations is poor in Chongqing City, mass transfer is very inconvenient.

3.4 Evident contradiction in urban and suburban passenger transport

At present, Chinese urban public transport and suburban passenger transport are managed by department of construction and transportation respectively, which belong to typical dual management mechanism. The ununited development planning, ununited regulations and standards and ununited tax policy, lead to evident contradiction between urban and suburban passenger transport operation. See table 1. With the quickening of the urban and rural integration process, this contradiction is becoming more and more serious. A survey in Gui'zhou province shows that the cost of the same bus on the same route in suburban operation is 2.45 times that in urban operation.

table 1 Prominent problems in urban and suburban passenger public transport

Item	Urban Public Transport	Road Public Transport
Managed by	Construction.	Transport.
Nature	Mainly public interest.	Business operation.
Policy	Preferential taxation policies.	Few preferential policies.
Taxation and fees	Reduce urban maintenance fees(or refund), urban education and additional fees (230-440 Yuan per month). Land tax of public transport depot can be exempted or the land can be allocated by the government.	Have to pay passenger public transport additional fees, road maintenance fees, transport management fees, industry and commerce tax, operation tax (2,537-1,904 Yuan per month), and investment in depot (1 million to 10 million Yuan), etc.
Fiscal sources	Policy subsidies by the government.	Few subsidies.
Approved passenger number	Approve passenger number according to domestic space (8 passengers per square meter).	Approve passenger number according to seat number and overload is not permitted.
Operation mode	Start at regular intervals, stops on the route for passengers to get on and off.	Irregular starting time, not allowing to stop halfway in principle.
Depot resource	Exempt from depot fees.	Pay depot fees and bus stop fees.
Route definition	Planned by municipal government. The route and cross districts.	Approved by district or county governments, most of the routes are not allowed to reach the urban area.
Operation entity	State owned public transport enterprises are in the absolutely dominant position.	Diversified operation participated in by state owned enterprises, collectively-owned enterprises and private companies.

3.5 Market operating management of urban public transport is not normalized

Due to the lack of a clear definition and orientation for urban public transport development, in some cities, the city government takes on all the affairs for public transport development, and carries out an exclusive operation. This leads to industry monopoly and heavy finance burden for the government, as the enterprise is not interested in innovative development. In some other cities, urban public transport is completely launched to the market. There may be tens of public transport operation enterprises in one city, this leads to cutthroat competition and waste of resources. Public transport routes are even auctioned, and the route operating right is transferred in some cities to acquire economic income, which influences industry image severely.

3.6 Incomplete regulation and standard system

Firstly, unified laws and regulations of public transport development have not been set up in China. Special provisions for urban public transport cannot be found from laws of National People's Congress, administrative rules of the State Council, or government regulations of the transport department of the state council. So planning, construction, operation and management etc. links to public transport development are lawless, public transport development policy is unstable with very high randomness, and priority for urban public transport cannot be implemented in aspect of land use, funds, right-of-way and operation subsidies etc.

Secondly, Chinese cities lack a scientific and reasonable pricing mechanism and standards for public transport. Systematic pricing mechanism is unavailable, ticket price ratio between different public transport modes is unscientific, which is unfavorable to integrated transfer of passengers between different transport modes, and influences the overall benefits of a comprehensive transport.

4. Challenges of urban public transport development

4.1 Rapid economic development

Currently, China is in the key period to construct a well-off society and also in a highly overlapped period of industrialization, motorization, urbanization and marketization. The rapid economy and society development accelerated the adjustment of economic structure, and gradually upgraded the consumption structure, which generate high passenger and freight transport demand, safe and reliable, economical, efficient, convenient, comfortable and even individualized value orientation. How to further enhance transport capacity and increase transport efficiency and service quality becomes a key issue to be studied and solved by the government in the near future.

4.2 Rapid urbanization

In recent years, Chinese urbanization increases at a speed of more than one percentage per year, which means more than a 10 million population is transferred from countryside into cities per year, see Fig. 7. By the end of 2007, Chinese urbanization level was 44.9%. Nearly 10% of the population in the world lives in Chinese cities. With the city scale expanding continuously, urban and rural boundary tends to be fuzzy, and transport contact between the urban and suburb area becomes more close. Therefore, unified planning

coordination must be strengthened for urban transport resources in order to realize integrated urban and rural transport development, so as to enable urban and rural residents to enjoy the same or similar transport services.

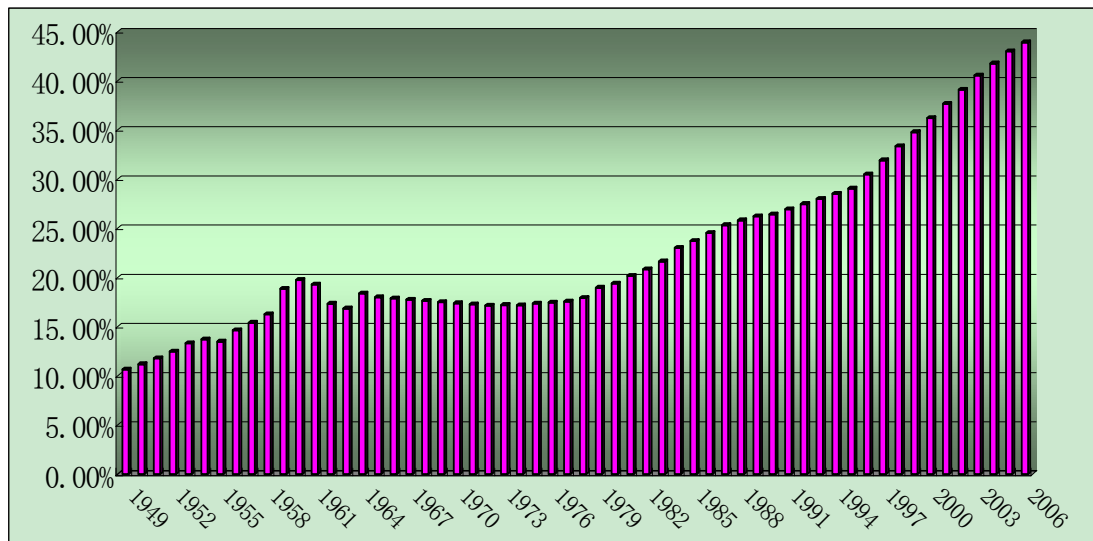


Fig. 7 China's Urbanization Process

4.3 Rapid motorization

At the end of Sep. 2008, the number of motor vehicles was 170 million in China, increased by 5.17% compared with that of 2007. The private car number is about 40.18 million, increased by 13.71% since the previous year. see Fig. 8. Rapid increase of motor vehicle leads to the obvious increase of travel frequency and travel distance.

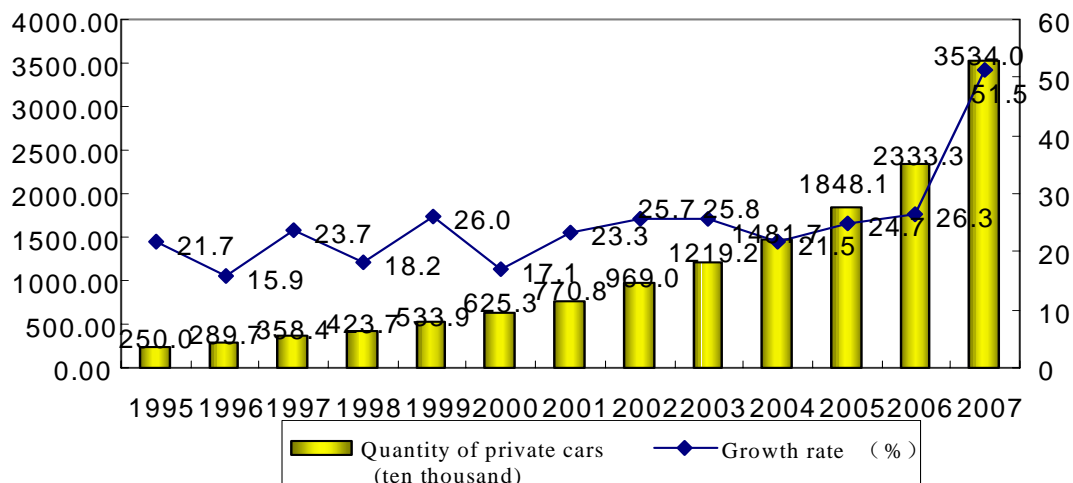


Fig. 8 Quantity of Private Cars and Growth Rate in China

Annual average increase of motor vehicle quantity during the tenth Five-Year Plan is 11.3% in **Beijing City**. At the end of August 2008, motor vehicle quantity was 3.39 million, average increase 1050 vehicles per day.

Motor vehicle in Beijing developed from 2300 in the early period after the founding of New China to 1 million in 1997, during **48 years**; but it only took **6 years** from 1 million to 2 million in 2003; and it took **3 years and 9 months** from 2 million to 3 million in May 2007.

In Beijing, Travel frequency by car in 2005 was 3.16 times/vehicle-day, average travel distance increased from 9.7 km in 2000 to 14.0 km in 2005. But the average loading ratio of a car was reduced from 1.57 persons to 1.26 persons.

4.4 Resource restraints

The unit of GDP energy consumption was 1.43 tons of standard coal/ten thousand dollars in China in 2005, equivalent to 11.5 times of Japan, 7.7 times of France and Germany, 4 times of America in the same period. Currently, the total energy consumption of transport accounts for about 20% of total energy consumption in China. Transport energy consumption of Beijing, or Shanghai accounts for over 80% of the total urban petroleum consumption. At present, the external dependency of petroleum in China exceeds 50%, the transport energy consumption brings a huge pressure to the energy safety in China.

The *Report On the Findings of Land Use Change in China in 2006* publicized by the Ministry of Natural Resources in 2007 shows that, as of Oct. 31, 2006, the cultivated area was 121.8 million hectares, reduced by 306,800 hectares since the end of previous year. Now, the cultivated land per capita is less than 0.0933 hectare in China, only 40% of world average level. According to the *Eleventh Five Year Plan Outline*, by the end of year 2010, national cultivated area must be no lower than 1.2 hectares, this means that the annual average of the reduced cultivated area should not exceed 43.3 hectares during the *Eleventh Five Year Plan*. At present, urban land development in China shows extensive and expansive development trends, and the city size is expanding quickly, see Fig. 9. Land resource constraints of urban transport development become increasingly intense.

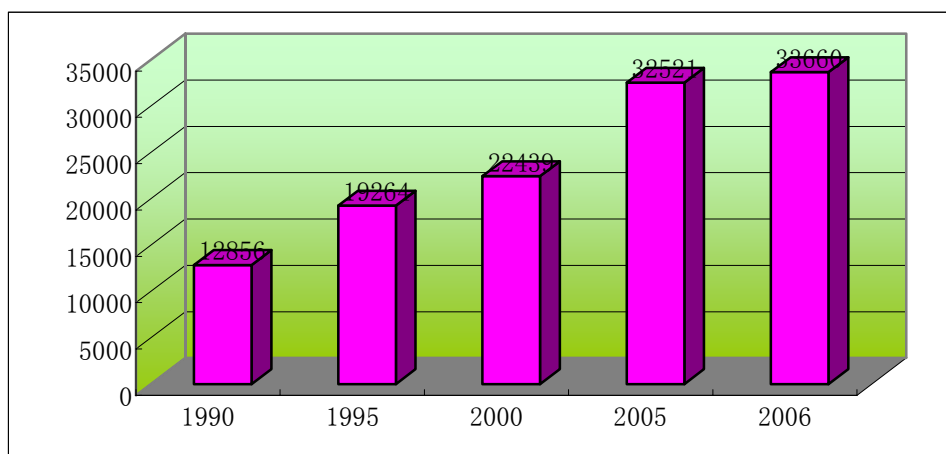


Fig. 9 Changes of Total Built-Up Area in Chinese Cities (unit: sq.km.)

5. Opportunities for urban public transport development in China

At the beginning of 2008, the State Council's Institutional Restructuring Plan was adopted in the First Session of the Eleventh National People's Congress, which determined to integrate the responsibilities of postal service, civil aviation, as well as the responsibility of the Ministry of Construction to manage urban passenger transport into the newly organized Ministry of Transport (MOT). The *Super-Ministry System* reform provided a good opportunity for the transport development in Chinese cities. Chinese cities will take the opportunity to deepen the institutional system reform earnestly, integrate administration bodies for the urban public transport sufficiently and explore the transport administration system with organically unified functions, so as to increase administrative efficiency, and provide an institutional guarantee to quicken the urban public transport development.

6. Suggestions for promoting Public Transport Priority in China

6.1 Acceleration of construction laws and of the regulations system as well as industrial standards at the national level

Firstly, public transport management regulations and administrative provisions at the national level should be issued as soon as possible, thus to provide legal and uniform guarantee for industrial development. Major issues such as an integrated responsible body for urban public transport responsibilities, orientation, planning, construction, operation, supervision, and market access should be defined in these regulations.

Secondly, accelerating the issue of standards and criteria for urban and rural public transport ticket pricing, vehicle, taxes subsidies etc. to complete the supervision and accounting mechanism for policy-based losses, to formulate operable policy measures, and to issue subsidy mechanism for public transport are also very urgent. Ticket price level of public transport should meet endurance of the residents, and a low ticket price policy should be looked for in order to increase overall attraction of public transport. The price ratio of ground public transport and rail transit should be reasonable, and ticket system and ticket price should be favorable to integrated transfer mode between different modes, so as to facilitate the travel of the public.

6.2 Regulate market operating management

A service supply system with a dominant government supply, under participation of diversified operation entities should be established gradually. By means of state-owned leading, scale operation, orderly competition mode, continue to keep the government as main supply body for public transport services, in order to increase the quality, reduce the cost, guarantee safety and fairness by operation of scale. Meanwhile, through properly competition, break down exclusive monopoly, and increase development vigor of urban public transport system, and to broaden fund resources. Explore to franchise urban public transport to a few enterprises for comparison in price, operation performance and operation cost, so as to promote public transport operation in an indirect competition mode.

6.3 Accelerate the reform of urban and suburban passenger transport

management

Break up the management barrier in urban and rural areas and strengthen the connection of urban and suburban transport infrastructure. Plan and coordinate the relationship between urban and suburban passenger transport and normalize long distance public transport development. In addition, intensify the remission of taxes related to urban and suburban passenger transport, and further reduce travel cost for the masses, to promote integrated development of urban and rural passenger transport.

6.4 Establish market supervision system of public transport

As the organizer of urban public transport, the government must carry out result (namely, satisfactory degree of the masses) oriented effective supervision for the marketized public transport services, and pay attention to collect evaluation information from the public for the quality of public transport services. Establish an index system for service quality evaluation, and formulate supervisory rules. Strengthen the evaluation of enterprise service quality to encourage the enterprises to improve service quality.

6.5 Establish a coordination mechanism and implement a land use guarantee

The city government should establish a coordination mechanism for transport planning, and intensify coordination for land usage of public transport facilities. Planning for urban public transport development should be included in the detailed planning of land usage after comprehensively balanced by planning, and land departments, so as to guarantee the implementation of public transport land.

Land for public transport facilities should be reserved in urban land use planning, and arranged with priority in the construction land. Meanwhile, supervisory mechanism should be completed, any organization or individual should not seize or change land usage without authorization. In addition, it should be defined that the city government shall guarantee the implementation of land for public transport facilities. For public transport facilities land use should be obtained in the form of an administrative allocation.

6.6 Reform the public transport investment and financing policy

Explore funds from different sources and provide powerful funds guarantee for public transport development. Firstly, municipal government should put the public transport development in important position when distributing the public finance funds, and implement governmental financial investment in public transport development sufficiently; next, extract certain proportion from government land grant fee and administrative income to establish a special fund for public transport development, to provide stable fund resources for public transport development. Next, attract and encourage individuals, enterprises and foreign funds to participate in the public transport investment, construction and operation in the forms of joint venture, cooperation or commissioned operation etc, so as to broaden the channel of fund resources.

In Beijing, urban public transport development was reformed significantly at the beginning of 2007, Beijing Municipal Transport Committee, Development and Reform Commission, Planning Committee, Financial Bureau, Public Security Bureau formulated the *Opinions On Development of Public Transport Priority* jointly. It was defined to purchase public transport services in the form of public disbursement, namely, change the original government subsidies for urban public transport into fixed government public finance disbursement.

Hangzhou municipal government specified that the government would withdraw 5% of city land grant fee income for public transport development every year;

Administrative Regulations for Urban Public Transport in Xi'an specified that, public transport enterprises in the whole city should add 300 new public transport vehicles per year to increase the supply. The purchase disbursement was paid by the government.

Changzhou municipal government formulated a relatively stable development policy for the development of Public Transport Priority since 2007. The municipal government specified: 10% of non-taxable income (unified funds of the government, or administrative charges) should be withdrawn from municipal administrative bodies compulsorily, establish a public transport development fund every year, and all of the funds will be used for public transport development. This limit was further increased to 20% in 2008.

6.7 Strengthen Transport Demand Management and induce the public to take public transport

Chinese cities should take measures in advance, quicken the formulation of related policy measures, through economic, technical, management, administrative etc means, to induce the public travel behaviors reasonably. Some measures such as differentiated parking charge, elastic work time etc transport demand management policies may be implemented, restrict the use of cars reasonably, encourage walking, public transport etc. environmentally friendly transport modes, reduce total urban transport demand, increase utilization rate of transport resources and the overall operation efficiency of the transport system. Through adjusting the distribution of transport demand in time, space and different transport modes, keep the relative balance between the transport supply and transport demand.