

# The Construction on “Green Commuting” Three-dimensional Public Transportation Governance System for Chinese Cities

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**Keywords:** Public Transportation, Congestion, Green Commuting, City Management.

**Abstract:** By using the method of comparative analysis and quantitative analysis with qualitative analysis, studies on the favourable measures, characteristics and experience and achievements in the development of city green public transportation of the world typical countries and cities. In an attempt to provide reference for the large and medium-sized cities of China to construct the "five one" "green commuting" three-dimensional governance system that includes urban bus, rail transportation, taxi, bicycle and pedestrian, then can effectively solve the problem of traffic jams. The new and original in this paper is solving practical problems from the angle of effective demand by using the methods of comprehensive analysis and comparison.

## 1 INTRODUCTION

In recent years, with the development of social economy, the number of China domestic private cars are also increasing, thus also causes of urban road traffic congestion and traffic difficult. To solve the traffic congestion, ensure the traffic smooth, become an important issue that should be solved in the city's economic and social development.

## 2 THE PRESENT SITUATION OF CHINESE CITY TRAFFIC JAM

At present, many large and medium-sized cities in China are exposed to different levels of traffic jams and congestion problems, especially in Beijing, Shanghai, Wuhan, Xi'an, Guangzhou, Chongqing and other big cities, traffic congestion is becoming more and more serious. Motor vehicle average speed of mega cities in China is already down to 12 km now by the past 20 km, in some big cities central area, the mean vehicle speed has fallen to 8 - 12 km. In the 31 national cities whose population over 1 million mega , the majority of traffic load is close to saturation, while some of the central area of the city traffic has close to half paralyzed. The car runs 100 km outside the city only needs about an hour or so, while in the central area of the city 10 km mileage

may consume more than an hour, the serious traffic jam time can last 2-3 hours, which brings great inconvenience to people's traffic, and directly affect the people's work and life (Daqing Zhang, Zhihong Zhang, 2002).

## 3 THE MAIN REASON FOR THE CITY TRAFFIC JAM

Throughout Chinese domestic city traffic situation, we can find that the main reason leading to the city traffic congestion can be attributed to the following:

### 3.1 Motor Vehicle Especially Private Car Ownership Increased Rapidly

Taking Beijing as an example, according to statistics, as of 2013, the number of motor vehicle has reached more than 5.371 million vehicles (Tab. 1). According to the survey of Beijing City Transportation Research Centre, if not to limit, the largest car ownership in Beijing is about for 5.5 million. If in accordance with the principle of “traffic restrictions based on the last digit of license plate numbers” from Monday to Friday, the largest number of cars ownership in Beijing is about for 6.7 million (Fig. 1).(Yanyan Sun, Zhijian Lv, 2013)

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Table 1: Beijing motor vehicle quantities important change cycle TAB.

NO.	Motor vehicle quantities (million)	Increasing number (million)	Date	Time spent
1	5.371	0.171	2013.12	1 year
2	5.200	0.216	2012.12	1 year
3	4.984	0.175	2011.12	1 year*
4	4.809	0.790	2010.12	1 year
5	4.019	1.019	2009.12	2 years and seven months
6	3.00	1.000	2007.5	3 years and nine months
7	2.00	1.000	2003.8	6.5 years
8	1.00	0.9977	1997.2	48 years
9	0.0023		founding	

\*Since 2011, the car lottery purchase policy has been taken in Beijing.

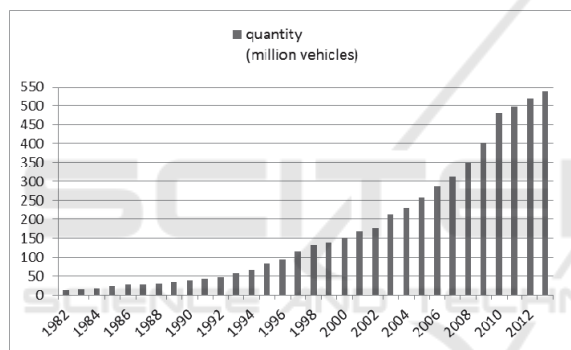


Figure 1: Beijing motor vehicle quantities variations in 1982-2013.

### 3.2 The Number and Speed of Road Construction Can't Meet the Needs of the Rapid Growth of Motor Vehicle

Taking Beijing as an example, each a net increase of 1 million cars, it needs to increase the capacity of network 2.82 million cars km. This's equivalent to the entire Beijing third ring Road Network Capacity or 30% road network capacity within fifth ring (Qingheng An, 2014). Road construction, both in terms of quantity, or in terms of speed, the construction period is relatively long, can't meet the needs of the rapid growth of motor vehicle parc.

### 3.3 Not Set up the City Effective Expressway and Roads, Secondary Roads, Branch Supporting Transport Network

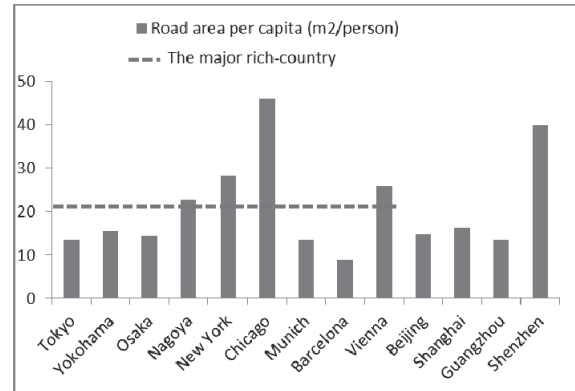


Figure 2: The per capita road area comparison of some main cities of domestic and foreign.

At present, during the road network construction, most of China city often only pay attention to the planning and construction of expressways and trunk road, but didn't pay full attention to secondary road and branch. Because city secondary road and branch outdate facilities, poor road conditions, vehicle speed is significantly lower than expect, the efficiency of road network composed of city main line, trunk, branch is low. Motor vehicles are racing to the city expressway and arterial road, resulting in peak hour traffic flow is too concentrated, thus causes congestion (Fig. 2) (Yifan Wang,2009).

### 3.4 Traffic Management Is Incompetence

The planning and design (set) of Line, intersection, signal lamp is not perfect, such as cross road entrance layout, traffic signal lights transform set etc.

### 3.5 Public Transportation Does Not Play Its Due Role

City bus number is less, poor condition, no point, slow speed, more crowded, poor comfort, site less or unreasonable setting, compared to private car, the city bus lacks of great superiority, so the public is not willing to choice for city bus.

## **4 THE PRACTICE TO SOLVE THE PROBLEM OF ROAD CONGESTION IN LARGE AND MEDIUM-SIZED CITIES OF DOMESTIC AND FOREIGN**

In the process of promoting the economic development and the process of the city, a number of large and medium-sized cities of domestic and foreign have met road congestion, many cities have taken many measures suit one's measures to local conditions, and received good results. In this process, vigorously develop the city public transportation, open Easy Access, implement green commuting, become a common practice of large and medium-sized cities of domestic and foreign.

### **4.1 Implement of Public Transport Priority Policy, Vigorously Develop the City Public Transportation**

The public transportation development of Brazil Curitiba city can be said to be the model of the world. Through more than thirty years of development and perfection, the public transport system in Curitiba city has become the efficient, convenient, comfortable, advanced public transportation system of the world, and regard as the "Surface Subway". Its success lies in establishing the systematic and perfect integrated public transport system, implementing a series of perfect and facilities public transport priority policy.

#### **4.1.1 The Systematic and Improved Integrated Transport System in Curitiba**

There is an integrated public transport system composed of a perfect line and adequate vehicle in Curitiba city, passenger traffic volume of up to 1.9 million people every day. Bus lines covered all the urban roads, among them the bus lane is 60 km, bus daily mileage of 38000 km. The roads in Curitiba city are mainly composed of fast line, feedback line, interregional contact line, station express line, conventional integrate radiate line and city centre circle line.

#### **4.1.2 The Perfect and Matching Bus Priority Policy in Curitiba City**

In Curitiba city, a series of perfect and matching public transportation priority policy have been

implemented. Such as in the use of the land, priority must be given to the traffic, during the city planning, should give priority to the development of public traffic system. The design of traffic system on the vehicle speed, convenient mounting problems, the overall structure of the system have made detailed provisions, attract customers by the convenient and fast public transport system. To build the bicycle lane, even at the cost of occupancy vehicle lane, put the public traffic and pedestrian (not the private car and the vehicle) on the top priority. Using the management system of integrate public traffic system that separates government functions from enterprise management, separates operation and system of ticket. The government uses a variety of economic policies that favourable to the social development to encourage people to use public transport, such as free purchase tickets for more than 65 years of age for the elderly and children under the age of 5, subsidies by the government if someone spends more than 6% excess wage for public transport, the poor in poor areas can exchange for a bus ticket by using for sweeping garbage etc. Traffic management departments of the government adopts a series of traffic management measures to ensure the priority development of public transport, such as through the reasonable countermeasures to reduce parking on road, reduce the taxi driving no passenger, the taxi must be docked at the taxi stand, prevent intersection clogging by delimiting no parking sign at the junction, give priority to bus through the intersection, etc., ensure public traffic unblocked. (Liren Duan, 2001)

### **4.2 Efficient Taxi Traffic System**

As the representative of taxi operation in Singapore, taxi plays the almost equally important role as subway. Singapore subway daily passenger capacity is slightly higher than the 1 million passengers, and taxi passenger capacity has nearly 1 million passengers daily, while taxies in Singapore are only 18000 cars. The main reason is that one is the fare is reasonable, in Singapore, the taxi first km traffic cost is 2.4 Singapore dollars, within 10 km per 240 meters 10 cents, above 10 km is 10 cents per 225 meters, second is the booking very convenient, GPS equipment with universal Singapore taxi, the control centre tracks vehicle through the GPS system, people can at any time convenient appointments to the taxi, the whole process is fully automatic, manual operation is not needed extra.

### 4.3 Stable and Time-sensitive Rail Transit

The subway construction in Moscow, New York, Paris, London, Tokyo, Berlin city is developed, the line length is more than 100 km, passenger traffic volume is more than 1 million passengers daily average also. The subway in Beijing, Shanghai, Guangzhou, Tianjin, Wuhan, Dalian and other cities of China has also achieved good results on rail transit such as subway, light rail, streetcar, single track, city expressway (Tab. 2, Fig. 3) (Jin Luo, 2009).

Table 2: The subway construction of part of the world cities.

City	Urban population (Million)	Line (km)	Passenger traffic (Million people/daily)
Moscow	8.50	234	7.00
Barcelona	2.70	61.8	0.91
Berlin	3.12	138.4	1.07
Chicago	2.85	155	0.40
Hamburg	2.65	89	0.60
Mexico City	9.20	62	2.80
Tokyo	11.70	218	3.80
Rotterdam	1.05	40	10.13
Rome	2.90	25.5	0.28
New York	9.00	438	2.85
Paris	10.00	294	3.08
London	4.00	387.9	2.50

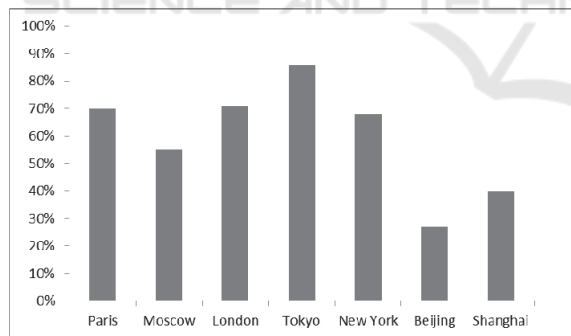


Figure 3: The orbit traffic carrier ratio of part of the world cities.

### 4.4 Convenient Trips Done by Bike

Now, more and more countries and cities vigorously promote and implement of bicycle, some countries and cities have even established public bicycle system.

#### 4.4.1 The European Third Generation Public Bicycle System

Since the late 1990s, after the first generation and the second generation of public bicycle system, France Paris, Germany Lyon, Spain Barcelona and other countries and cities of European have researched and development of a new generation of public bicycle system which using modern electronic, information integration, wireless communication and Internet technology. The biggest characteristic of this kind of system is able to know who is in the use of bicycles, which brought the fundamental change of the mode of management system, provide a convenient and fast and healthy way to traffic for people, reduce the city air pollution, but also effectively solve the management issues such as bicycle is easy to be stolen, damaged and lost and etc., thus improve the utilization rate of resources, enhance the image of the city (Xue Xiao, Zhiian Lv, 2013).

#### 4.4.2 "With the Bicycle as a Fundamental" Low Carbon, Green Transportation Policy

Holland, Denmark, South Korea and other countries implement the "With the bicycle as a fundamental" low carbon, green transportation policy. Holland nation has about 16 million people, but has about 18 million bicycles, bicycle per capita ranks first in the world. In Holland, more than 30% of the traffic is by riding a bicycle to complete. In recent 20 years. Holland has completed up to 120 items about the bicycle traffic scientific research projects, and the Treasury provides substantial financial support each year. In Holland law, during the city planning, road facilities should not truncate main bike lanes, city construction should not cause inconvenience to the bicycle traffic.

The Danish population is about 5.3 million, but bikes are about more than 3 million vehicles. In Copenhagen's, 1/3 of commuters ride bicycles, including officials, wealthy and celebrities, the British newspaper "Independent" reported that Copenhagen is be worthy of the name of the city of bicycle. At present, in the city of Copenhagen, 37% of people riding bicycles, 28% by bus and train, 31% drive, walk 4%, in 2015, 50% of the people in Copenhagen will go to work and school by bike ways.

In recent years, the South Korea government vigorously promote green commuting by bike. In order to encourage people to ride a bicycle green

commuting, the South Korea government introduced a number of policies, such as the formulation of "2010 bicycle policy promotion plan", established the "bicycle day" to promote the national bicycle road network construction. Government invests to construct bicycle demonstration city, bicycle demonstration zone and bicycle using demonstration school, subsidies and buys insurance for bike commuters. Launches the "green plus P shop", cyclists can buy cheaper goods from the "green plus P shop" than conventional store. The newly revised "Road traffic law" provisions that it should must to establish bicycle lanes and must to provide space for bicycle parking during new city construction.

#### 4.5 Effective Traffic Demand Management

As a representative office in Hong Kong, although there are many people and little land, high rises, it is congenitally deficient for development of traffic conditions, but we rarely see traffic congestion in common like other metropolis. This is largely due to the organic combination between the construction planning and the public traffic system of Hong Kong. In Hong Kong, the public transport service is variety and unique, the public can choose their right traffic according to the fast, comfortable and convenient, such as railway (including subway), tram, bus, minibus (small bus), taxi and ferry. The government of Hong Kong is committed to the development of public transport, not to encourage the attitude of private cars. The private cars operation cost is higher: The first is difficult to park, most office buildings do not have their own parking spaces, foreign visitors can't park in the master's home, and the special parking position is less, and fees is higher; secondly, parking is expensive; third is the oil prices is high; the last is all kinds of fees for per vehicle per year are not little also, and have a limit to apply for a licence. (Ming Wu, 2011)

## 5 CONCLUSIONS

Throughout the various approaches to solve the problems of road congestion of the large and medium-sized cities of domestic and foreign, we found that develop the public transport, open up the green channel, construct the "five one" "green commuting" three-dimensional system of social management that includes urban bus, rail transportation, taxi, bicycle and pedestrian, this can be the effective way to relieve the congestion

problems in large and medium-sized cities in china. In the actual operation of the process, the city managers should suit one's measures to local conditions, deep analysis and argumentation, good planning, to formulate a scientific program, then can receive good effect.

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