CICERO Working Paper 2003:02

Enabling sustainable urban road transport in China:

A policy and institutional perspective

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February 2003

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Tittel: Enabling sustainable urban road transport in China: A policy and institutional perspective

Forfatter(e): Xiliang Zhang and Xiaojun Hu

CICERO Working Paper 2003:02
13 sider

Finansieringskilde: Norges forskningsråd

Prosjekt: Promoting sustainable road transportation in China: The greening of the automobile industry

Prosjektleder: Lin Gan

Kvalitetsansvarlig: Lin Gan

Nøkkelord: bærekraftig utvikling, transport, bilindustrien, klimapolitikk, Kina

Sammendrag:
Dette arbeidsnotatet er et forsøk på å undersøke tilnærmingen til bærekraftig veitransport i kinesiske storbyer, med hovedvekt på politiske og institusjonelle perspektiver. Studiet kobler de store ”ikke-bærekraftige” aspektene ved Kinas veitransport med manglende planlegging og forvaltning av dette området og den nasjonale bilindustrien, og gir noen forslag og anbefalinger for endringer og justeringer i denne politikken. Notatet viser også eksempler på vellykkede erfaringer fra utenlandske byer som myndighetene i kinesiske byer kan lære av.

Språk: Engelsk

Rapporten kan bestilles fra:
CICERO Senter for klimaforskning
P.B. 1129 Blindern
0318 Oslo

Eller lastes ned fra:
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Title: Enabling sustainable urban road transport in China:
A policy and institutional perspective

Author(s): Xiliang Zhang and Xiaojun Hu

CICERO Working Paper 2003:02
13 pages

Financed by: The Research Council of Norway

Project: Promoting sustainable road transportation in China: The greening of the automobile industry

Project manager: Lin Gan

Quality manager: Lin Gan

Keywords: sustainable development, transportation, auto industry, climate policy, China

Abstract: This paper is an effort to investigate the approach to sustainable urban road transport in Chinese mega cities with an emphasis on policy and institutional perspectives. The study links the major “unsustainabilities” of China’s urban road transport with those deficiencies in urban road transport planning and management and China’s auto industry policy, and gives some suggestions and recommendations for policy change and adjustment. The paper also provides some examples of successful experiences from foreign cities in urban road transport development from which Chinese cities can learn.

Language of report: English

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Acknowledgements

This paper is based on a joint research project between Research Center for Contemporary Management and Institute of Energy, Environment, and Economy (IEEE), Tsinghua University, China, and the Center for International Climate Change and Environmental Research – Oslo (CICERO), Norway. The authors greatly acknowledge the financial support from World Wide Fund for Nature (WWF) and the Research Council of Norway.

1 Introduction

Since China adopted its economic reform policy in the early 1980s, cities in China have gained great development momentum while China's economy has kept an average annual growth rate of 8–9%. The number of cities in China reached 663 by 2000. Rapid urbanization has become a trend along with economic development. Cities are becoming larger, and the concentration of urban population is becoming higher. The number of residents in Beijing for example, has climbed from 5.8 million in 1985 to 11 million in 2000. The population density in Beijing currently averages 654 people per square kilometer, reaching 27,300 people per square kilometer in the central area (Zhang, 2001).

Fast economic growth and urbanization have brought a greater-than-ever challenge for the Chinese urban road transport sector. The question is then how China will be able to meet the increased demand for urban road transportation. Sustainable urban road transport appears to be the only approach, given the resource and environmental carrying capacity constraints. This paper is an effort to investigate the approach to sustainable urban road transport in Chinese mega cities with an emphasis on policy and institutional perspectives. The study links the major "unsustainabilities" of China's urban road transport with those deficiencies in urban road transport planning and management and China's auto industry policy, and gives some suggestions and recommendations for policy change and adjustment. The paper also provides some examples of successful experiences from foreign cities in urban road transport development from which Chinese cities can learn.

The article is arranged as follows. The following section discusses the features of sustainable urban road transport within the domain of environmental economics. Section 3 analyses the major problems and challenges of China's urban road transport development. Section 4 discusses the major deficiencies in urban road transport planning and China's auto industry policy, and the possible policy changes and adjustments. Section 5 provides some lessons on urban road transportation from cities in other countries that China can draw from. Section 6 contains the concluding remarks.

2 Features of sustainable urban transportation

What does sustainable transportation look like? Before answering this question, it might be useful to say some words about 'sustainability' or 'sustainable development'. The most widely quoted definition of sustainable development is development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Pearce and Warford (1993) translated the definition into economists' language by replacing the concept of needs with that of well-being or welfare – "sustainable development is development that secures increases in the welfare of the current generation provided that welfare in the future does not decrease" – taking it as intergenerational equity. Sustainable development is the achievement of continued economic development without detriment to the environmental and natural resources (Elliot, 1993). If future equity and environmental quality are concerns, it makes little sense to ignore equity and environmental impacts that occur during this generation in distant places (Litman and Burwell, 2001). So far, there has not been an authoritative interpretation on sustainable development. Efficiency and equity (for both intra and inter generation), however, are often regarded as the major indicators of sustainable development.

Now let us return to sustainable urban transportation. The goal of sustainable transportation is to ensure that environmental, social, and economic considerations are factored into decisions affecting transportation activity (MOST, 1999). A sustainable transport system must provide mobility and accessibility to all urban residents in a safe and environmentally friendly mode of transport (Mohan and Tiwari, 2000). Sustainable urban transportation development integrates economic, resource, and environmental concerns, and can meet the current need without compromising the ability of future generation to meet their needs (Liu et al., 1999). Liu et al. (1999) also believes that the goals of sustainable urban transport development are i) to meet necessary demand for transport service; ii) to reduce the reliance on petroleum; iii) to avoid negative environmental consequences; iv) to reduce the reliance on non-renewable energy sources; and v) to reduce the cost of infrastructure construction. Pang (2001) lists the main elements of sustainable urban transport development as i) balanced supply of infrastructure, equipment, and management and demand of the society for transportation services; ii) rational use of limited resources; iii) reduced consumption of non-renewable resources by changing consumption mode; iv) avoided environmental and ecological degradation; and v) equitable allocation of transportation facilities among the society.

So far there has not been a well-established definition of sustainable urban transportation. Like sustainable development, sustainable urban transportation should also, in essence, embrace the major concerns about economic efficiency and intragenerational and intergenerational equity. Specifically, sustainable urban transportation should include at least following elements: i) an ability to meet the necessary demands of urban residents for transportation services; ii) economic efficiency and environmental soundness; iii) adequate attention paid to the socially disadvantaged; and iv) integration with urban planning.

3 Problems and challenges of urban transportation in China

3.1 Unbalanced growth of motor vehicle population and infrastructure construction

Driven by increased economic activities and sustained high urban population growth, the growth in urban transport has been significant. The total civil motor vehicle population reached 16.08 million in 2000 with an annual growth rate of 11.3% during the 1990s (Table 1; Figure 1). The total civil motor vehicle population in Beijing increased from 0.34 million in 1992 to 1.04 million in 2000 with the annual growth rate of 14.9%. In Shanghai, the biggest city in China, the civil motor vehicle population growth rate was 11.8% during the same period. In some cities, the vehicle population growth rate exceeded 30%. Figure 1 shows that the number of private vehicles has grown by 22.5% each year, and passenger vehicles by 18%, indicating that private and passenger vehicles have been the major driving forces to China’s civil motor vehicle growth.

Urban transport infrastructure construction also showed rapid development over the past decade. For example, 13–29% of the city’s investment in infrastructure was put into the transport sector over the past decades in Shanghai (Table 2). As a result, urban road transport infrastructure in Shanghai gained a sustained development momentum (Table 3). A similar trend is seen in Beijing (Table 4) and Shenzhen (Table 5). However, the growth of urban motor vehicles has been much faster than that of urban road construction (Figure 2). The unbalanced growth of motor vehicle population and transportation infrastructure is a major contributor to severe traffic congestions in Chinese cities.

Table 1. Motor vehicle development in China Unit: million

	Vehicle Population	Freight Vehicles	Passenger Vehicles	Special Vehicles	Private Vehicles
1990	5,51	3,58	1,62	0,31	0,82
1991	6,06	3,87	1,85	0,34	0,96
1992	6,91	4,28	2,26	0,38	1,18
1993	8,18	4,83	2,86	0,48	1,56
1994	9,42	5,44	3,50	0,49	2,05
1995	10,4	5,69	4,18	0,54	2,50
1996	11,00	5,58	4,88	0,54	2,90
1997	12,19	5,82	5,81	0,56	3,58
1998	13,19	6,09	6,55	0,55	4,24
1999	14,53	6,66	7,40	0,57	5,34
2000	16,09	7,16	8,54		6,25

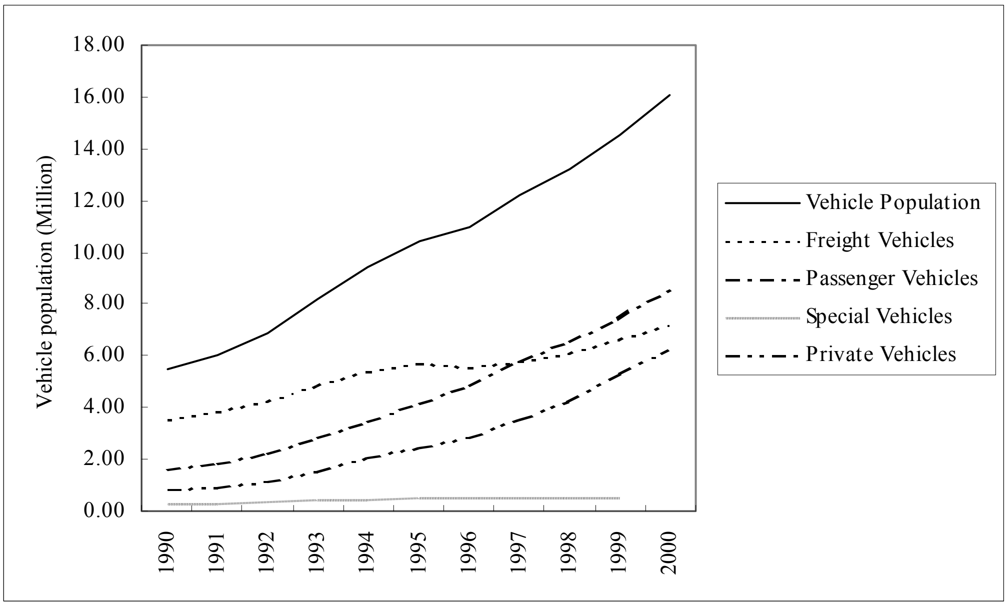

Figure 1. Motor vehicle development in China.

Table 2. Investment in urban infrastructure in Shanghai (in billions of Yuan)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total Infrastructure Investment (A)	6.1	8.4	16.8	23.8	27.4	37.9	41.3	51.7	49.2	45.1
Transport Infrastructure Investment (B)	0.9	2.3	3.3	7	7.2	8.2	9.3	9.6	6.2	11.4
Urban Road Investment	0.2	0.4	1.1	3.4	3.3	4	3.2	5.1	2.2	2.3
Subway Investment	0.2	0.4	0.7	1.4	1.5	1.2	2.4	1.2	2.9	6.9
B/A (%)	15	27	20	29	26	22	23	19	13	25

Table 3. Road development in Shanghai

	Road length (km)	Urban road length (km)	Road area (Mm^2)	Urban road area (Mm^2)	Vehicle road area (Mm^2)	Urban vehicle road area (Mm^2)
1991	4818	1653	60	27	42	18
1992	5043	1677	64	27	45	18
1993	5105	2722	66	40	46	28
1994	5192	2799	69	43	49	30
1995	5420	3008	74	48	53	34
1996	5599	3118	81	52	59	38
1997	5713	3553	85	59	63	43
1998	6678	4712	98	73	73	54
1999	6829		107		79	
2000	9568		131		100	

Table 4. Road transport construction in Beijing

Year	Road length (km)	Road area (Mm^2)	Underground pathways	Road transport bridges
1978	2078	16.11		351
1980	2185	16.64		351
1985	2979	24.85	31	460
1990	3276	29.05	46	562
1995	3194	34.94	128	582
1996	3665	38.07	161	646
1997	3637	40.61	162	693
1998	3721	42.14	167	715
1999	3753	43.53	174	787

Source: BSB, 2000

Table 5. Infrastructure of Shenzhen Economy Special Zone (1985–1998)

	1985	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Length of new road (km)	161	257	275	288	299	296	335	657	737	789	747
Area of new road (m^2)	371	613	657	635	657	651	813	869	1124	1287	1308
Per capita area of new road (m^2)							5.51	5.73	7.01	7.35	7.08
City bridges	16	30	30	37	39	41	52	102	125	145	164

Note: Does not include Bao'an and Long'gan districts

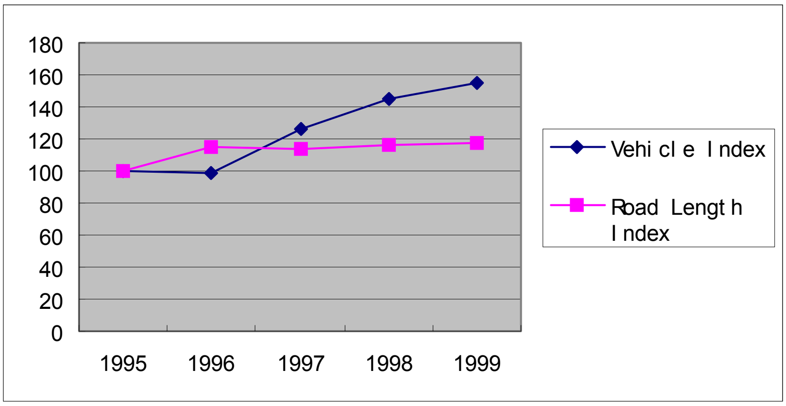

Figure 2. Vehicles and road development in Beijing (1995-1999)

3.2 Declining public bus passengers vs. increasing taxies and private cars

There has been a relative decline in public bus usage and an increase in taxi usage in large cities. The share of conventional buses in the total passenger vehicle usage decreased from 97% in 1996 to 55% in Shanghai, while that of taxis increased from 2.33% in 1991 to 20% in 2000 (Table 6). Further, during the ninth Five-Year-Plan period, the motor vehicles in use averaged to 3.5 million per day in Shanghai, and taxi vehicles in use per day increased by as much as 88%. In Beijing, the taxi population increased from 11,147 in 1990 to 65,127 in 2000 with an annual growth rate of 19%.

Table 6. Passengers using public transport in Shanghai over the past decade, in volume by millions and percent.

	Big buses		Special line buses		Subways		Taxis		Total
	(million)	(%)	(million)	(%)	(million)	(%)	(million)	(%)	(million)
1991	5694	97.17	29	0.5			137	2.33	5860
1992	5868	96.42	50	0.82			168	2.76	6086
1993	5596	93.67	109	1.82			269	4.5	5974
1994	5225	88.75	209	3.55	5	0.08	448	7.61	5887
1995	4817	84.74	301	5.24	65	1.13	511	8.89	5694
1996	1909	63.17	427	14.13	88	2.91	598	19.79	3022
1997	1878	63.45	500	16.89	111	3.75	471	15.91	2960
1998	1971	60.74	517	15.93	126	3.88	631	19.45	3245

Recently there has been an explosion in the number of private vehicles, especially private cars, in some large cities in China. The rapid growth in the private vehicle population has been a major driving force in China's civil motor vehicle growth, and also an important contributor to urban transport congestion. In 2000, the number of private vehicles reached 6.25 million, of which 3.04 million were private cars. The average growth rate in the number of private cars was as high as 31.3% over the past decade in China. There was 0.12 million motor vehicles added in Beijing by the end of June, 2002. This was 50.6% higher compared to the same period last year, and approximately 90% of them were private vehicles. In Shanghai, 20,000 private cars were registered by the end of June 2002, 5000 more compared with the same period of last year. The population of private motor vehicles was 65,867 in 1996 in Shenzhen, and the figure was doubled by 2000 (Li, 2001).

This situation and its consequences resulted in increased traffic congestion and pollution, as well as putting the socially disadvantaged in a more unfavorable position.

3.3 High uncertainty of energy supply

Energy consumption in China's road transport sector increased from 36.4 million tce in 1990 to 93.6 tce in 2000 (Table 7; Figure 3). The average growth rate was about 10% each year during the past decade, which is very close to that of motor vehicles. Gasoline consumption increased by 8.28% on average, while diesel increased by 14.93%. Approximately 85% of gasoline output and 20% of diesel output was consumed by motor vehicles in 1999 in China (SETC, 2001). The oil consumption of motor vehicles in 2005, 2010, and 2015 is projected to be 51.75 million tons, 59.84 million tons and 73.14 million tons, respectively, even taking into account of significant improvement in road traffic condition, fuel quality and vehicle performance. Currently China's oil output is about 163 million tons each year, and there will be no significant increase in production in the future. This is to say that civil motor vehicles will have consumed nearly half of China's oil output in 2015 or the total oil import in 2000. Another projection shows that the oil consumption of motor vehicles would reach 150 million tons in 2020. In that case, the oil consumption of motor vehicles alone would be equal to China's oil output, making China's oil consumption much more dependent on the international oil market.

Table 7. Energy consumption in China's road transport sector

	1990	1995	2000
Energy consumption (Mtce)	36.4	59.5	93.59
Gasoline (Mt)	19.9	31	44.1
Diesel (Mt)	4.9	9.5	19.7

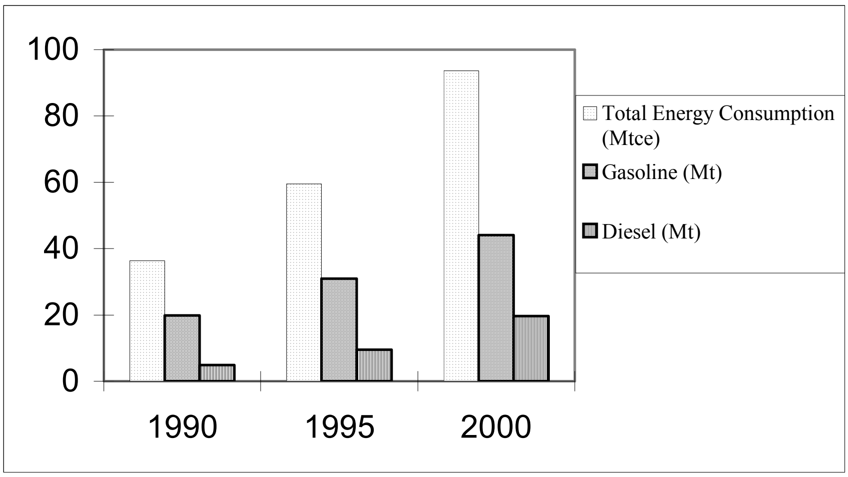

Figure 3. Energy consumption in China's road transport sector

3.4 Low efficiency of energy use

As mentioned above, there would be a significant shortage of oil supply in the future in China. On the other hand, however, the efficiency of oil utilization has been low in China, especially in the transport sector. Table 8 shows a comparison of China's motor vehicle oil consumption efficiency with major developed countries. The United States has been the world leader in terms of single vehicle size, vehicle population and delivery capacity. Its oil consumption per vehicle (2.26 ton), however, is much lower than that of China (3.09 ton). The per-vehicle average fuel consumption in Japan and Germany in 1989 is only approximately one-third of that in China in 1999.

Table 8. Comparison of China's vehicle efficiency with those of developed countries

	USA	Japan	Germany	China
Vehicle population (millions)	176.19	52.45	31.28	14.53
Gasoline consumption (Mt)	347.61	32.02	25.31	31.99
Diesel consumption (Mt)	50.46	27.28	14.38	12.86
Total fuel consumption (Mt)	398.07	59.30	39.69	44.85
Average consumption per vehicle (t)	2.26	1.13	1.27	3.09
Year	1987	1989	1989	1999

3.5 Environmental pollution

As China's capital, Beijing is the city with the largest motor vehicle population. The growth of motor vehicles in Beijing has also been the fastest among Chinese cities. In Beijing, the major pollutants from motor vehicles are CO, HC, NOx, and particle matter (PM). Table 9 shows the contribution of motor vehicles to pollutant emissions in Beijing between 1995 and 1998. Emissions of CO and NOx from motor vehicles were higher, not only in the total volume of emissions, but also in the concentration of emissions. Further, the contribution of motor vehicle emissions in 1998 was higher than that in 1995. Figure 4 demonstrates that NOx concentration in the busy transport areas was 35% higher than that of the city's average, indicating that exhaust emissions from urban transport sector is an important contributor to urban environmental problems. According to Beijing Environment Protect Bureau, of the 1.1 million light motor vehicles, only 0.43 million or 39% could meet the city's standard on motor vehicle emissions in 2001. For heavy motor vehicles, the percentage was only 8% (Li, 2002).

A survey conducted in Shanghai in 1998 demonstrates that each index of air pollutants from motor vehicles exceeded the standards at more than 20 major measured intersections. Among the measured locations, 30% were heavily polluted, 65% polluted to a great extent, and only 5% lightly polluted.

In addition to local environmental pollution, transportation sector is also a major CO2 emitter, as most fuels consumed in the sector are fossil fuels. In 1990, the transportation sector contributed 5.66% of China's total CO2 emission (RTCCCCS, 1999).

Table 9. Comparison of the emission contribution from motor vehicles and fixed sources between 1995 and 1998

	Motor vehicles		Fixed sources	
	CO	NOx	CO	NOx
1995				
Emission (10^3t/yr)	1,075.1	93.4	325	140
Emission contribution (%)	76.8	40.2		
Concentration contribution (%)	76	68		
1998				
Emission (10^3t/yr)	1,290	115	270	150
Emission contribution (%)	82.7	42.9		
Concentration contribution (%)	84.1	72.8		

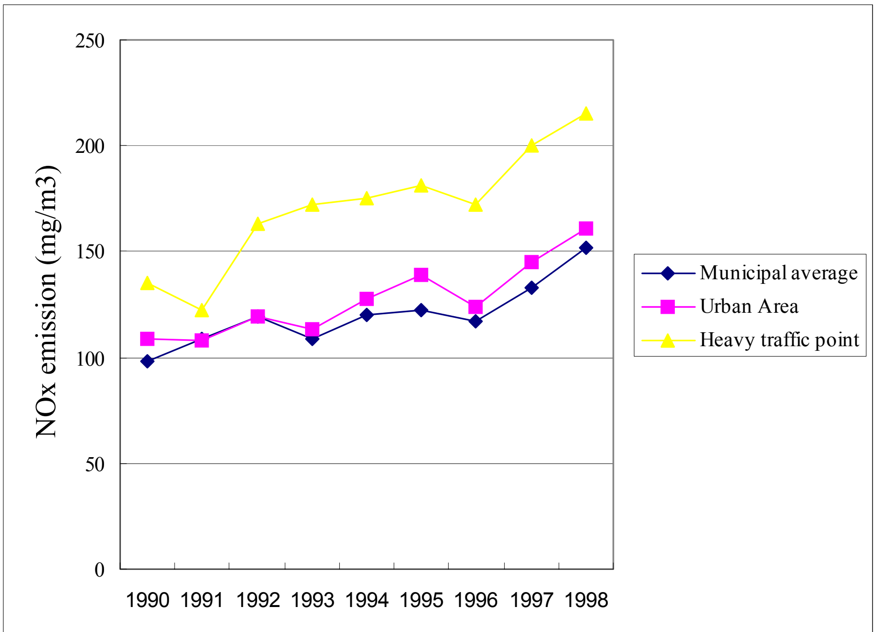

Figure 4. NO_x emission concentrations in different areas of Beijing

4 Urban transport planning and auto industry policy: a critical review

4.1 Urban transport planning

Urban transport planning plays a vital role in achieving sustainable urban transportation. There were important deficiencies in urban transport planning in Chinese cities in the past. To meet the increasing demands for transportation services and to solve the severe congestion, significant attention was paid to construction of transportation infrastructure such as road and traffic bridges. But as early as in 1962, Downs (1962) pointed out that the suppressed demand for private transportation would immediately fill any added freeway capacity. Theoretically increasing road capacity might ultimately meet the demands for transportation, but this is not a cost-effective approach by any means.

There is substantial evidence that road building might be able to ameliorate the tension of transportation demand in a short run, but it might not be true from a long-term perspective. Driven by fast economic growth and urbanization, there is a large suppressed demand for private transportation in China. To meet the suppressed demand for transportation, adding road capacity should not be regarded as the only way. Instead, more attention should be paid to looking for demand-side measures in urban transport planning. In this context, a set of command-and-control and market-based instruments should be introduced to manage transportation demands in urban transportation planning in China, such as fuel tax, higher parking fees, and restricting the use of motor vehicles in some urban areas.

That emission control standards are not strict enough has been an important contributor to air pollution in the populous Chinese cities. The motor vehicle emission standard adopted in such famous cities as Beijing, Shanghai, and Shenzhen is only equivalent to that of Euro I. Low emission standards have made auto manufacturers reluctant to produce energy-efficient and low-emission products because production costs of low-emission autos are often higher than those of normal autos. Low emission standards also contribute to the inadequate technological innovation of Chinese auto industry.

Municipal governments encourage their residents to buy private cars as they often believe that the consumption of private cars contributes to municipal economic growth, job creation, and tax revenue. However, the externalities of private cars, such as environmental pollution and other social costs, should also be taken into account. Increased road capacity and motor vehicle use may have negative as well as positive economic impacts because the marginal productivity of increased transport is declining, and vehicle use imposes external costs that can offset direct economic gains (Helling, 1997). Some private vehicle supporters also argue that increased ownership of private cars does not necessarily deteriorate the traffic situation, as increased ownership is not equal to increased traffic. This, however, can happen only when a set of appropriate transportation policies are already in place and transportation planning has been well integrated with urban planning, particularly urban land use, which is clearly not the case in most Chinese cities.

The public transportation sector is often strictly controlled by the municipal government. Most public transportation sectors run in loss, and cannot provide quality service. This largely leads to some residents switching from public transportation to individual transportation. To improve public transportation service, substantial investment is needed. Due to the budget limitation, municipal governments often cannot provide adequate funds for the purpose. On the other hand, however, under existing management systems, private investors are either not allowed to invest in the sector or reluctant to invest in the sector due to lack of incentives. In this regard, substantial efforts should be made to liberate the public transportation sector and diversify the financing resources.

An important institutional barrier to effective urban transport management is poor coordination between the key governmental agencies involved in urban transportation planning, such as the construction department, the communication department, the public security department, and the environmental protection department. As a consequence, transportation policies from different government agencies are often not consistent with each other. Cooperation is also lacking in the implementation of some transportation policy. For example, the cooperation between the environmental department and public security department is a precondition for any success in the implementation of a new emission control standard. An innovative institutional framework needs to be set up in most Chinese cities to achieve sustainable transportation development.

4.2 Auto industry policy

China's auto market has been heavily protected because the government has tried to make China's auto industry become an important driving force in bolstering China's economy. Driven by job creation and tax revenue incentives, local governments are often enthusiastic about developing a local auto industry. As a consequence, there are more than 2000 auto manufacturers in China. But the auto industry concentration is only 44% in China while it ranges from 80% to 90% in USA, Japan, and Korea. Most auto manufacturers are far from reaching an economy of scale. For example, there are 15 car manufacturers in China, but per manufacturer output is only 47,000. As a result, domestically made autos are often characterized by high prices, high energy consumption, high pollution emission, and low safety and conformability. This is an important contributor to the unsustainability of China's urban transportation. Further, currently the direct contribution of the auto industry to GDP is only 0.8% in China (Wu, 2002), indicating that the auto industry has not contributed to China's economy as much as the government had hoped.

Sustainable urban transport requires that motor vehicles be low energy consumption and low pollution with competitive prices. It is also in line with the trend of auto product development in the world. A big issue is that currently most Chinese auto manufacturers have difficulties producing such automobiles given their scale and technical capacity. Furthermore, China has now also become a member of WTO. The heavy protection policy that Chinese automobile industry has enjoyed will taper off gradually. Chinese automobile manufacturers will be under heavier and heavier pressure of competition from foreign counterparts. In this regard, there is an urgent need for the government to formulate innovative policies to facilitate the industry's technological upgrading and concentration such that the Chinese auto industry can provide appropriate vehicles for sustainable urban transport, and would be able compete with foreign manufacturers in the Chinese market as well as the world market. In this context, sustainable urban transportation would induce the technological upgrading and restructuring of China's auto industry.

5 Sustainable urban transport planning: some lessons from foreign cities

Singapore

Singapore has a population of three million and covers an area of 650 square kilometers. The daily traffic averages to seven million person-times. Among others, the successful stories of urban transport management include:

1) Integrating transport planning with land use

Since the late 1960s, the Singapore government has been responsible for construction of industrial areas and provided apartments for 86% of its households. Transportation planning has been integrated with the building of high dwelling buildings industrial areas.

2) Strict control of ownership and usage of private cars.

The annual increase rate of motor vehicles has been kept lower than 3% by the government. Motor vehicle owners need to pay motor vehicle use tax. Since 1990 there has been an annual quota for added private cars, and people need to bid to own private cars. As a result, the price that buyers ultimately pay is often 5–6 times that of the car's C.I.F. Since 1975 there has been a permit system for private vehicle operation in some areas. Such market-based instruments as tolls, parking fee, and fuel tax have also been well designed and implemented in Singapore's transportation management.

3) High quality public transport

There is a subway of 83 km and an urban railway of 130 km in Singapore. The urban railway has been well integrated with the subway system. Currently two companies run the public bus system in Singapore. The Land Communication Bureau and the two companies have jointly established a traffic information service system where residents can access traffic information through the Internet and telephone. The system brings significant convenience to passengers, and largely increases the efficiency and reliability of the public bus system.

Seoul

Seoul has a population of 17 million, and population density in its central areas is as high as 18,000 per square kilometer. Driven by the government's favored automobile industry policy and the fast economic growth, the volume of passenger cars increased by 20% each year since 1985. Since 1996 the government doubled fuel tax and began to levy road congestion fees. These policies caused some residents to switch from private transport to public transport.

At the same time, priority has been given to public transport. Subways and other rail vehicles carry 5 million passengers each day. The public road transport system is operated by tens of companies, and carries 10 million passengers each day. The price and the routes are stipulated by the government.

Another successful story is that transportation planning has been well integrated with urban planning. In the urban planning, new development areas have been built in the surrounding satellite towns. The center city with its advanced public transport system is linked with these satellite towns by a net of urban railways and roads.

6 Concluding Remarks

Most Chinese mega cities are facing challenges from transportation in their development. The road transportation systems in these cities are often characterized by low efficiency, heavy congestion and high environmental pollution. Deficiencies in urban transportation planning and management have largely contributed to the urban transportation problems. Among others, these deficiencies include:

1)Relying heavily on supply-side approaches such as road capacity expansion;

2) Encouraging individual transportation, particularly the ownership of private cars;

3) Inadequate emission control;

4) Lack of integrated command-and-control and market-based instruments; and

5) Lack of coordination mechanisms among the key government agencies involved in the formulation and implementation of transportation policy.

Some of these deficiencies have a negative impact on China's auto industry as well, since the urban transport model represents the market demands for the auto industry. For example, weak emission control standards give Chinese auto makers fewer incentives to conduct technological innovation to produce energy-efficient and low-emission cars, and ultimately reduce their competitiveness in the world market. So, substantial efforts should be taken to formulate innovative policies and build institutional arrangements. For this, substantial lessons could be learned from foreign cities such as Singapore and Seoul.

The Chinese auto market has long been heavily protected by the government. Due to lack of competition, domestically made autos are often characterized by high prices, high energy consumption, high pollution emission, and low safety. These products have contributed to the unsustainability of Chinese urban road transport to a large extent. Now that China has become a member of WTO, China's auto industry is facing a greater-than-ever challenge, given the technological capability, the scale, and management skill of most of its manufacturers. In this regard, there is an urgent need for the government to formulate innovative policies to facilitate the industry's technological upgrading and concentration such that Chinese auto makers would be able compete with their foreign counterparts in the Chinese market, as well as the world market. From the demand-side perspective, however, sustainable urban road transportation would induce the technological upgrading and restructuring of China's auto industry, and ultimately bring China's auto industry on the road to sound development. So, integration of urban road transport planning and China's auto industry policy will play a vital role in China's sustainable urban road transport and auto industry development.

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