

THE PERSPECTIVE OF URBAN TRAFFIC AND ITS POLLUTION CONTROL IN CHINA

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SUMMARY

The urban traffic and its pollution control have become one of the focal points in urban development and environment in China. This paper introduces the general situation of this problem for some Chinese metropolises, and put forward a comprehensive strategy for our developing cities in this field.

URBAN TRAFFIC

Since the rapid development of urbanization and industrialization during the past fifteen years, the discordant increase between the motor vehicles, bicycles and urban road systems, as well as other relevant problems, have made most of our cities more crowded with motor vehicles, bicycles and pedestrians.

In Beijing City, for instance, by the end of 1988, the motor vehicles and bicycles had increased to 430,000 and 7,300,000 respectively, the urban district population counted up to 5,000,000, with the exception of the temporary resident population 1,300,000. However, in spite of the fact that the passenger and goods flow volumes increase more than 100 and 50 times by contrast with the year of 1949, the existing length of urban roads increases only 12 times, the density of urban road is 0.7 kilometer per square kilometer, and the one third of the load is undertaken by lorries.

At the peak hour, 7:30 to 8:30 am, all buses were overloaded almost double what they did in many districts of these urban areas. At that moment, the bicycles shuttled everywhere. In Tianjin City, the volume of bicycle traffic was up to 37,000 per hour in some sections of main communication artery.

It is obvious that the mixed traffic is always apt to result in traffic congestion. For example, the average speed of the buses from some 23 kilometer per hour decreased to 13 kilometer per hour during the past forty years in Chengdu City. This situation will keep itself up in the future if the urban population and scale cannot put under control.

The tendency concerning the increase of urban population scale, motor vehicles and bicycles, passenger flow volume, as well as the situation of Chinese cities and towns (Figure 1-3, Table 1) are as follows:

TABLE 1. The situation of Chinese cities and towns

Population		>1,000,000	<1,000,000-500,000	<500,000-200,000	<200,000	Town
Number						
Year	1980		45	70	108	2,874
	1988	(23)	58	110	266	11,481

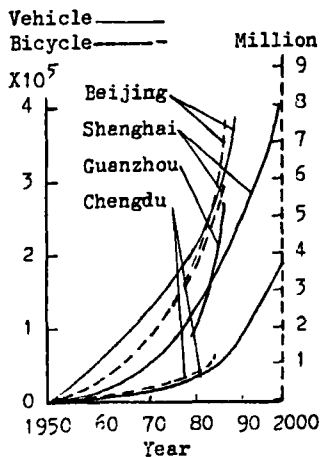


Figure 1. The increase tendency of motor vehicles and bicycles in some big cities

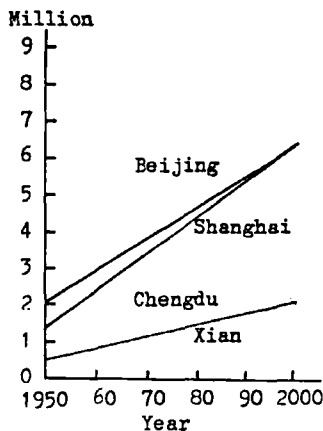


Figure 2. The development tendency of some urban district population scale

Recently, urban road transport has become a social and economic issue. For this problem, Guangmin Daily, a Chinese famous newspaper has published a series of investigations on this special subject gathered from many experts and law makers of the four biggest cities, Beijing, Tianjin, Shanghai and Guangzhou by the year of 1988. A lot of constructive suggestions have been put forward. It would be a perfect plan if the traffic nuisance had been taken into full consideration.

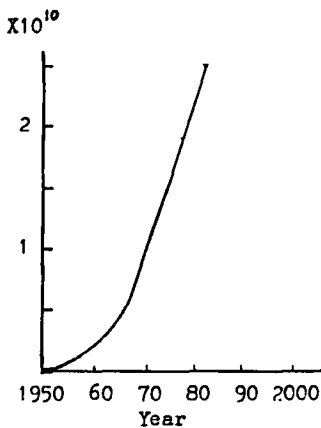


Figure 3. The increase tendency of passenger flow volume in urban transport

TRAFFIC NUISANCE

It has been pointed out that the communications have resulted in one of the major sources of air pollution and noise in our urban areas (author, 1986).

A lot of results from investigations and environmental monitoring have clearly provided the gravity of this problem. For example, the lead content of blood in a traffic policeman is much higher than that of other people, and its increase goes along with his length of service. Meanwhile, the similar condition occurs in dust and surface soil adjacent to a highway, especially on the winddown side of the heavy traffic roads because most of petro-engines motor vehicles are operated on leaded fuel.

The epidemiological investigation shows that incidence of lung cancer is positively correlated to the extent of air pollution. The road transport, however, is one of the important factors. In fact, there are many carcinogenic or toxic substances which come from motor vehicle emissions.

There is enough evidence to prove that the dust makes up to 52.40% in the TSP and it's up to 81.2 mg per cubic meter during the summer and autumn in some downtown districts. Most frequently, you can get sight of the soot emitted from motor vehicles around the urban roads or crossroads. No wonder, the concentration of carbon monoxide exceeds Grade-3 of National Ambient Air Quality Standards for heavy traffic roads even up to 44 mg per cubic meter, especially in tunnel or valley streets. For instance, its concentration is up to 8 to 12 times of sanitary standards, even worse in the Tunnel of Huangpu River in Shanghai City. As for the traffic noise, there is no exception either. We can really see that the urban traffic has turned into one of the vital environmental problems.

MINIMIZING TRAFFIC NUISANCE IN CITIES

Urban traffic nuisance is becoming increasingly serious. We had better lay down reasonable traffic policy to promote the development of urban communications and transport, and make full use of existing urban road systems with a view to solving traffic problems and improving urban environmental quality at the same time. A series of vigorous and effective measures have been plotted and taken by the central government and local authorities concerned. They are as follows:

- . Urban traffic forecasting and planning;
- . Perfecting urban traffic regulations and control, tightening up vehicle management, setting up one-way streets and special bicycle ways, and staggering office hours for easing of congestion of cars and bicycles;
- . Adopting preferential measures so as to develop urban public traffic, such as light railways, underground railways for big cities including Beijing, Shanghai, Tianjin, Guanzhou, Haerbin, Changchun, Nanjing, Hongzhou, Chongqing, Shenyang, Shenzhen, trolleybuses and buses for middle- and small-sized cities, in which, Zigong City has been making use of natural gas instead of leaded fuel for buses since the end of 1950's;
- . Urban relief roads, ring roads and the connection of radiated

expressways with near cities, for example, Beijing, Tianjin, Guanzhou, Chengdu, etc., and some illustrations of urban road systems are shown in figures 4-6; Drawing up emissions standards for conveyances and setting up corresponding monitoring systems.

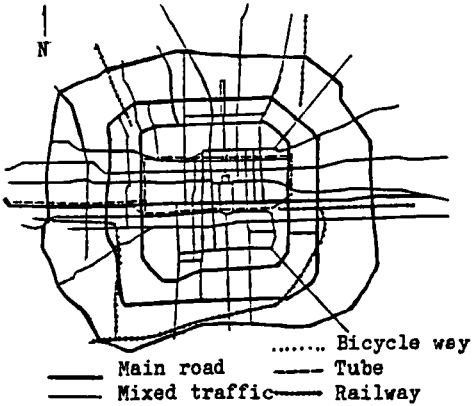


Figure 4. Schematic of urban road system in Beijing



Figure 5. Schematic of urban road system in Shanghai

Since air pollution control and traffic noise abatement for urban road transport involve many aspects and departments, it is usually required of us to take them into full consideration from every angle and a chain of matters. It may be considered as a systems engineering. As has already been pointed out, it would be based on the principles of minimizing of sources and its effects. The following illustration concerning traffic strategies (figure 7) is probably useful for our developing city.

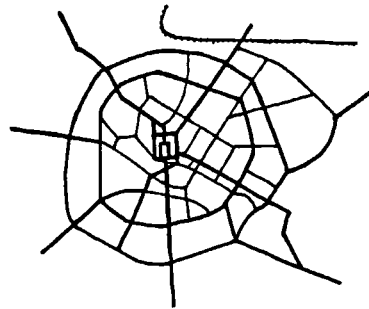


Figure 6. Schematic of urban road system in Chengdu

Legislation	Management	Self-discipline	Technology	Long-term programme
MINIMIZATION OF SOURCES				
Urban scale & population control	-Vehicle standards & monitoring	Administrator	Design Manufacture Processing Maintain Inspection (for vehicle)	Management science Urban development & environment
Authoritative organization	Polluter pays principle			Non-polluting & low-noise vehicle
Standards: vehicles fuel & its additive	Fuel quality Energy conservation Public transit priority Impose restrictions on (private) cars			Low-polluting energy & its efficiency New traffic policy & regulation Raising funds
MINIMIZATION OF EMISSIONS				
Traffic & environmental planning	-Emission standards & monitoring -Traffic noise standards & monitoring Making full use of urban road system Proper running speed	Driver	Fuel composition Saving energy	Reducing no-load Urban road system & distribution Potential risk assessment Cost-benefit analysis Low-polluting & low-cost freight transport
MINIMIZATION OF EFFECTS				
City planning, urban roads buildings parking areas Open & green space	Ambient air quality standards & monitoring Traffic capacity	Cyclist & pedestrian	Building shapes Building surface material	Inner beauty in urban environment Information exchange & cooperation

Figure 7. Schematic of traffic strategies in developing cities

URBAN SCALE AND ITS POPULATION

Our urban traffic and its nuisance abatement are similar to other global environmental issues. In the final analysis, the most important task is the negative population growth, especially in our developing cities with population more than one million. If the metropolises are unconstrained and plunge into wanton development, the consequences would be too ghastly to contemplate. The urban population scale control must be put into practice through legislation. No matter how strict the population policy may be, its enforcement is absolutely correct from a long-term strategic point of view. The ceaseless perplexity about urban traffic and its nuisance are no exception.

STANDARDS AND POLLUTER PAYS PRINCIPLE

It is a matter of common observation that we have already set up some emissions standards for motor vehicles. This is only a beginning. It is left to attain perfection. For instance, it would have something to do with not only means of transportation, but also urban road systems, open space and the distribution of buildings.

The polluter pays principle is perfectly right. However, we perhaps neglect one of the important factors, i.e. a factory and its products (such as motor vehicles or leaded fuel) which do not contaminate the environment before getting out of the factory. Nevertheless, it is probably unfair to say that the user of this product will become the polluter. It is disadvantageous to promote the development of science and technology concerned in the factory, especially the management science. By far, we would continuously perfect our technical policy under the prerequisites of legislation.

CITY PLANNING AND ITS INNER BEAUTY

During the last decades, there have been many changes in external appearance of most cities because of urban construction, but we often fail to take the inner beauty into full account. The environmental quality has been impaired by the unreasonable designing and distribution of urban roads and buildings which are located near these roads. In the midst of this, the traffic noise and air pollution have get from bad to worse in these areas. It is necessary for us to research further into the problem in the near future.

Though the level of investment in urban road system is too low, both ring roads and radiant roads have been brought to completion in many cities. Of course, we have got to overcome a lot of difficulties.

CONCLUSION

Urban traffic and its nuisance control are one of the long-term economic, social and environmental issues. We are required to go in international cooperation and exchange of informations.

During the past decade, many local governments have begun to pay attention to the seriousness and magnitude of this problem, some research programs are not only made by law makers and researchers, but are also deliberately dealt with by departments of communications, energy, planning, environment, forestry and auto industry. I can be sure that an authoritative organization concerning the urban traffic is to be set up.

If every strategical step of ours is based on science and technology, much improvement is certainly be made in our urban traffic and environment, to such an extent that our people would be less exposed to pollution.

Some diagrams were drawn by daughter T. Jia.