

# ON THE DISCORDANT URBAN DEVELOPMENT IN XI' AN CITY<sup>①</sup>

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**ABSTRACT:** On giving a description of the urban development in Xi'an City proper in recent years, this paper has made a comparison between Xi'an and some other cities in China about the achievements of the urban development. Compared with those other cities, Xi'an falls much behind, though its urban development in recent years has been fast and successful. An analysis to the urban development of Xi'an City has been made to reveal the discordance between the growths of economy and population and the constructions of urban infrastructure, municipal facilities and public services in recent years. The analysis has also unveiled that some urban problems, such as crowded traffic, tight housing, inconvenient living conditions, serious environmental pollution and so on, are not eased or even aggravated by the discordant developments. The causes of the discordant development have been probed into and some "software" suggestions helping to solve those problems have been put forward in the end of the paper.

**KEY WORDS:** Xi'an City, urban development, municipal administration, urban problem

Urbanization is a worldwide trend of development and one of the main contents of economic and social developments toward China's modernization. Its chief features are the rapid transformation of population from rural dwellers into urban residents and the accelerated expansion of city scale and/or amount. In recent years, China has been undergoing a very fast process of urbanization. Up to the end of 1996, according to an official census, the permanent residents living and working in cities have reached 24.37% of the total population in the country. Along with the rapid urbanization in China, however, many cities have encountered more urban problems like crowded traffic, tight housing, insufficient water supply, bad hygienic conditions, short medical facilities and so on, because the construction of urban infrastructure has not caught up with the growth of economy and population. In this paper, we will review

the problems of discordant development between the constructions of urban infrastructure and municipal facilities and the growths of economy and population in Xi'an City in recent years, reveal the causes of the discordant development, and try to make some suggestions of solving those problems.

## 1 INTRODUCTION TO XI' AN CITY

Xi'an, one of the birthplaces of Chinese civilization and an ancient city with an age of at least 3100 years, is located in the central part of China and the capital city of Shaanxi Province. In Chinese history, Xi'an had been the capital for 12 dynasties since 1136 B. C., because of its favorable location and natural conditions (plain land near the Wei River, temperate climate, and fertile soil with dense forest and grassland).

## 2 URBAN DEVELOPMENT IN XI' AN IN RECENT YEARS

In recent years, Xi'an has experienced a more rapid development than ever before. Up to the end of 1996, the built-up area in city proper was 148 km<sup>2</sup> and the registered population had reached 3.033 million. Among the population 2.206 million people (about 72.7% of the total) are permanent urban residents (non-agricultural population). Plus the transient population coming from surrounding rural areas and other places, the average population has reached up to more than 3.60 million. Meanwhile, population density in city proper had increased from 2548 persons/km<sup>2</sup> in 1990 to 2845 persons/km<sup>2</sup> in 1996 (Xi'an Statistical Bureau, 1992–1997).

### 2.1 Economic-Social Development and Population Growth

The period from 1990 to 1996 was a time of accelerated economic-social development in Xi'an's history. In 1996, the gross domestic production (GDP) in Xi'an reached 41.042 billion yuan (RMB), which was an increase by 14.9% over 1995 according to a fixed calibration, and more than a doubled number compared with 1990. This speed of development was higher than that of the whole country on the average for the same period. The expenditure level of urban residents reached 5930 yuan per capita in 1996, which has increased by 197.5% over that of 1993 yuan per capita in 1990.

From 1990 to 1996, the yearly natural population growth rate in the city proper kept at 0.50%–0.75% and the trend of fast population growth was under control. The yearly rate of mechanic population growth, however, was still rather higher and figured at 1.2%–1.8% during the same period. The non-agricultural population, growing even more rapidly, had mechanically increased by 12.6% in city proper from 1990 to 1996, which means a net increment of 30–50 thousand people each year or an annual 2.1% increase on the average (Fig. 1). Along with a faster

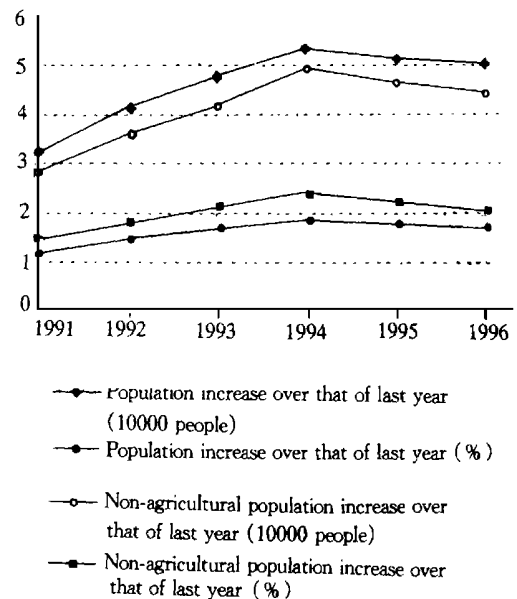


Fig. 1 Population growth in the city proper of Xi'an

pace of urbanization and thus a more rapid immigration of surplus labor force from rural area to the city proper, this kind of high mechanic population growth rate will still keep in a rather long period of time, though the natural population growth rate is low.

### 2.2 Urban Infrastructure Construction

In recent years, the infrastructure of Xi'an has been improved and enhanced very much: Road has been broadened, natural gas from Northern Shaanxi pipelined, new power plant set up, water supply canal from the Heihe River to the city dug, and urban environment harnessed. A series of those projects plus newly built Xi'an Xianyang airport, Xi'an–Yan'an railway, highways from Xi'an to Lintong, Tongchuan and Baoji cities, and enlarged capacity of communication facilities both cable and wireless as well as satellite signal receiving station, made Xi'an a modernized city.

Here we give two typical examples. The most rapid expansion in Xi'an in recent years had been communication capacity (Fig. 2). Up to the end of 1996, the capacity of programmed telephone exchange gates has been enlarged to the number of 811 330, which means the capacity of communication

in Xi'an has mounted into those advanced cities in China (Xi'an Statistical Bureau, 1992-1997).

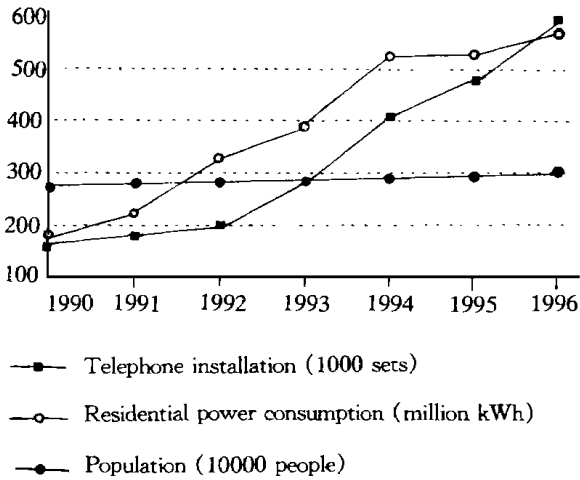


Fig. 2 Comparison between population growth and residential power consumption and telephone installation

The power supply in Xi'an has also reinforced during the same period. The total power consumption in 1996 had increased by 35.8% over that of 1990. In the meantime, residential power consumption in 1996 had gone up by 228.8% over that of 1990,

which greatly surpasses the growing speed of total societal power consumption during the same period (Fig. 2).

### 3 COMPARISON OF URBAN DEVELOPMENT BETWEEN XI'AN AND SOME OTHER CITIES

Although the economic-social development and the infrastructure construction in Xi'an in recent years have been successful and gotten many achievements, the economic booming and population growth have also exerted larger pressure on municipal administration than before. The improvements of urban mass traffic, municipal engineering, residential housing, running water supply, and hygienic and medical facilities were relatively stagnant. The speed of bettering living standard was uncoordinated with the pace of economic expansion and population growth. Compared with several other cities in China, the level of municipal facilities, living convenience and public welfare in Xi'an is quite low (Table 1) (Urban Societal and Economic Survey Team, State Statistical Bureau, 1992-1997).

Table 1 General situation (in city proper, up to the end of 1995) in some metropolitan cities of China

| Item                                                    | Total cities in China | Beijing | Tianjin | Shanghai | Nanjing | Qingdao | Guangzhou | Xi'an  | Lanzhou |
|---------------------------------------------------------|-----------------------|---------|---------|----------|---------|---------|-----------|--------|---------|
| Total population ( $\times 10^6$ persons)               | 500.1630              | 7.3372  | 5.9402  | 9.5666   | 2.6580  | 2.1837  | 3.8538    | 2.9827 | 1.6516  |
| Non-agricultural ( $\times 10^6$ persons)               | 200.1583              | 6.1940  | 4.7425  | 8.3380   | 2.2602  | 1.6619  | 3.1667    | 2.1615 | 1.3339  |
| Population growth (%)                                   | 0.59                  | 0.08    | 0.13    | -0.30    | 0.20    | 0.20    | 0.32      | 0.67   | 0.79    |
| Population density (person/km <sup>2</sup> )            | 298                   | 1606    | 1370    | 4651     | 2723    | 1982    | 2669      | 2798   | 1012    |
| Employment rate (%)                                     | 98.9                  | 99.7    | 98.0    | 97.6     | 98.4    | 98.2    | 97.9      | 97.0   | 99.0    |
| Wages (yuan/psn*a)                                      | 5832                  | 8353    | 6546    | 9513     | 7311    | 6877    | 10604     | 5024   | 5613    |
| Areas (km <sup>2</sup> )                                | 20465                 | 477     | 359     | 390      | 151     | 104     | 259       | 148    | 163     |
| Water supply (t/psn*a)                                  | 73.3                  | 91.5    | 46.7    | 80.1     | 128.6   | 48.5    | 221.3     | 50.5   | 62.1    |
| Power consumption (kW*h/psn*a)                          | 137.9                 | 136.3   | 175.7   | 215.9    | 180.4   | 269.6   | 495.5     | 178.0  | 292.1   |
| Telephone installation (sets/100 psns.)                 | 8.77                  | 29.41   | 20.70   | 24.10    | 29.95   | 20.06   | 47.16     | 15.37  | 18.50   |
| Road acreage (m <sup>2</sup> /psn.)                     | 2.8                   | 4.0     | 5.8     | 3.8      | 4.8     | 5.4     | 5.1       | 3.4    | 5.3     |
| Public traffic (trolleys & buses/10 <sup>4</sup> psns.) | 2.5                   | 7.3     | 3.6     | 11.1     | 8.7     | 8.7     | 7.2       | 3.7    | 4.2     |
| Greenery patches (m <sup>2</sup> /psn.)                 | 11.9                  | 23.9    | 5.1     | 5.6      | 36.0    | 20.8    | 70.6      | 11.1   | 11.6    |
| Hospital service (beds/10 <sup>4</sup> psns.)           | 36.0                  | 70.5    | 55.1    | 54.9     | 54.6    | 49.5    | 61.0      | 76.0   | 72.7    |

Concluded from Table 1, we know that in Xi'an, the urban construction is sluggish, municipal facilities and services are insufficient, population density is high, and living standard and employment rate are low. As mentioned above, the levels of residential power consumption and telephone installation in Xi'an during the period has gone up a lot, but it is still incomparable to many other cities (Table 1). Compared with Lanzhou, for example, also a hinterland city in even further west, Xi'an falls behind, not to speak of with other cities in booming eastern part of China.

#### 4 COMPARISON BETWEEN GROWTH OF POPULATION AND ECONOMY AND CONSTRUCTION OF PUBLIC AND MUNICIPAL FACILITIES

As mentioned before, the mechanic growth rate of population in Xi'an during the period from 1990 to 1996 kept at a rather high level. This is undoubtedly a very heavy burden on many aspects of municipal engineering and public facilities in Xi'an. Let's look at some of them in detail.

##### 4.1 Population Growth and Economic Development vs. Urban Traffic Service

In recent years, the urban traffic service in Xi'an has improved somewhat, but not much. Although the mileage of bus lines and the number of bus vehicles in service have increased, they have not caught up with the speed of population growth, and

thus the possession amount of buses and trolleys per 1000 persons had declined from 45 vehicles in 1990 to 34 vehicles in 1996. In the meantime, the total sum of passenger-times had also declined during the period (Fig. 3). Besides bus line's route setting and distribution, service time, management level and vehicle mechanic maintenance, the causes of passenger declining might relate to the ever-increasing numbers of taxi, mini bus and private motorcycles or cars—symbol of economic booming, each of which has driven part of passengers away. The immediate result of passengers' driving away has been more urban traffic jam, lower vehicle speed, more fuel or power consumption, more accidents, and inevitably more pollution (Table 2).

##### 4.2 Population Growth vs. Residential Living Convenience

During the period, the urban residential housing

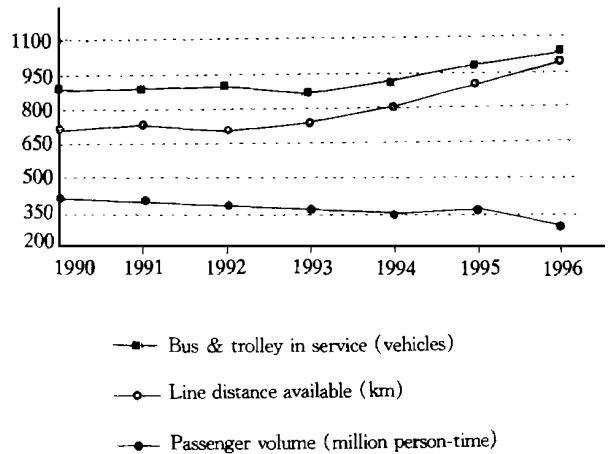


Fig. 3 Public traffic in Xi'an City proper

Table 2 Traffic cost going up and pollution aggravation caused by crowded urban traffic in Xi'an

| Year | Taxi in service (vehicles) | Traffic flow in city proper* (vehicles/h) | Fuel consumption per bus vehicle (L/100km) | Trolley power consumption (kW·h/100km) | Monetary loss by traffic accidents (million yuan) | Traffic noise background* (L <sub>90</sub> dB(A)) |
|------|----------------------------|-------------------------------------------|--------------------------------------------|----------------------------------------|---------------------------------------------------|---------------------------------------------------|
| 1991 | 4494                       | 648                                       | 25.46                                      | 93.05                                  | 2.6817                                            | 62                                                |
| 1992 | 5068                       | 687                                       | 26.09                                      | 94.36                                  | 3.5674                                            | 61                                                |
| 1993 | 7487                       | 910                                       | 32.73                                      | 93.71                                  | 5.6280                                            | 61                                                |
| 1994 | 8761                       | 1050                                      | 34.20                                      | 95.80                                  | 7.7133                                            | 63                                                |
| 1995 | 9814                       | 1256                                      | 35.70                                      | 97.30                                  | 8.3672                                            | 66                                                |
| 1996 | 9825                       |                                           | 33.50                                      | 89.10                                  | 9.4120                                            |                                                   |

\* Environmental Protection Bureau of Xi'an City, 1996. Report on the Environmental Quality (1991-1995).

condition has not improved very much (Fig. 4) due to the high rate of population growth. The floor space per capita has gone up only from 6.19 m<sup>2</sup> to 7.95 m<sup>2</sup> on an average, which has not reached 8 m<sup>2</sup>, the standard of "comparatively well-off" set up by the state's Ministry of Construction.

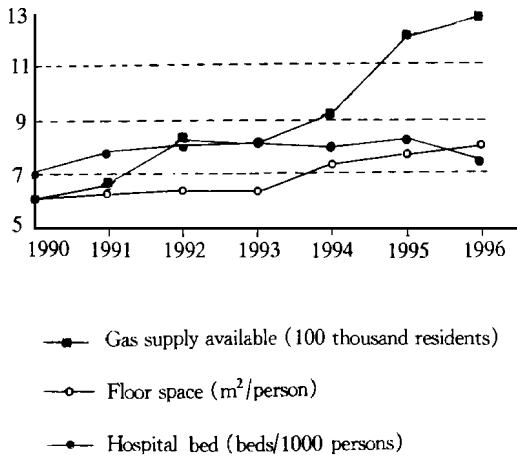


Fig. 4 Public welfare conditions in Xi'an City proper

Compared with other cities in China, the medical and health conditions in Xi'an were in the front row (Table 1). The improvement of the conditions, however, was sluggish in recent years (Fig. 4). The number of doctors, for instance, had merely gone up from 18600 in 1990 to 18800 in 1995 (only 14600 left in 1996 due to the calibration change), which means the difficulties for patients to see a doctor and to be hospitalized still exist.

The number of urban residents who have got either natural or coal gas supply in city proper had rapidly increased from 610 thousand people in 1990 to 1283 thousand by the end of 1996 (Fig. 4). This gives urban residents a more convenient life and also contributes to cutting down the energy consumption and enhancing up the environmental protection. Compared with other cities in China, however, the ratio of residents who get the supply is still low (only 42.3%), even lower than the average level, which was 60.1% for all cities in China in 1994.

The quantity of running water supply is one of the most important indexes of living standard. From 1990 to 1995, the capacity of residential running water supply only went up a little. By the end of 1995 it was 138 liters per capita per day, which increased only by 9.9% over that of 1990, or a 2.0% increase a year on an average. In 1996, the capacity increased to 240 liters per capita per day, due to the fulfillment of diversion works from the Heihe River through a man-made canal to Xi'an, which greatly alleviated the running water shortage in city proper. The water supply, however, is still incomparable to the level (270–450 L/d) by the 1970s in many western countries (Song *et al.*, 1994).

#### 4.3 Economic Development vs. Environmental Protection and Public Sanitation

According to a report by the Environmental Protection Bureau of Xi'an City<sup>①</sup>, during the period of 1991 to 1995, the environmental quality in Xi'an was not evidently improved. The main environmental problems existing in Xi'an are as follows: (1) Air pollution remained at a rather serious level, and the main pollutant was the total suspended particles (TSP) characterized by coal burning, especially in winter. (2) Water pollution, notably in waterways in city proper, was on the increasing, and water quality, characterized by organic contamination, was deteriorating. (3) Noise pollution did not change very much compared with the situation at the end of 1990. The traffic noise kept at a very high level and its mean source intensity level ( $L_{50}$ ) increased from 63.3 dB(A) in 1990 to 67.0 dB(A) in 1995.

The causes of pollution are rather complicated, but the main reason is that the fund allocated to environmental protection was incomparable with the pace of economic expansion. During the period, for example, the discharge of industrial three wastes (waste gas, wastewater, and solid residues) in Xi'an has

① Environmental Protection Bureau of Xi'an City, 1996. Annual Report on the Environmental Quality (1991–1995).

gone up because of the economic booming, but the disposal of and recycle of those wastes have been sluggish (Fig. 5). Among those wastes that have been properly disposed of, or recycled or purified, the lowest ratio happened to be the disposal of solid residues. It was only 30.2% in the worst year of 1994.

In the same period, the improvement of urban environmental sanitation was not satisfactory (Fig. 6). If we say the amount of disposal of rubbish has fairly increased, the amount of disposal of refuse from public latrines has greatly decreased.

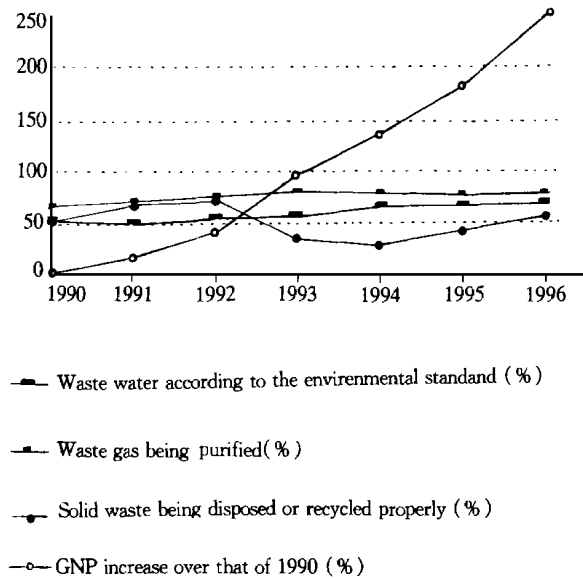


Fig. 5 Comparison between economic expansion and the ratio of disposal of industrial three wastes

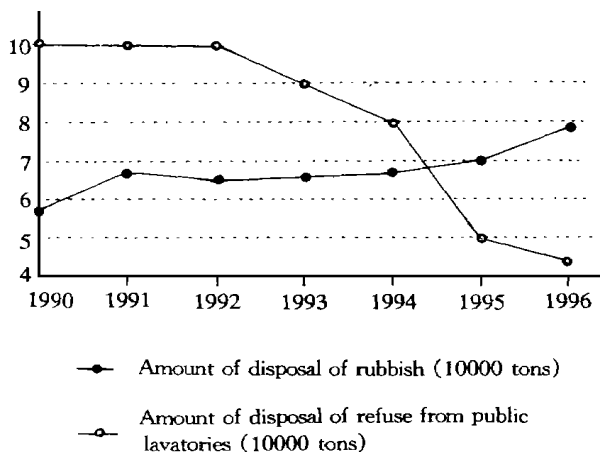


Fig. 6 Urban sanitation situation in Xi'an City proper

## 5 MAIN FEATURES AND CAUSES OF DISCORDANT URBAN DEVELOPMENT IN XI'AN CITY

### 5.1 Main Features of Discordant Urban Development in Xi'an

From the analyses above, we know that in recent years the urban development in Xi'an has been discordant. There exist many aspects that do not coordinate from each other. The main features of the discordance are as follows.

(1) The speed of mechanic population growth is too fast, while the construction pace of public services and residential welfare facilities such as gas supply and medical services is comparatively slow.

(2) The infrastructure construction is unbalanced. Some projects like power supply, telecommunication, water diversion work and inter-city communication run well and others such as urban traffic construction are stagnant.

(3) The economic expansion is very fast, and the environmental protection and pollution control fall much behind.

### 5.2 Possible Causes of Discordant Urban Development in Xi'an City

There are various causes leading to the discordant urban development. Here are some that may be the fundamental ones:

(1) Uncontrolled mechanic population growth. Urban development process itself offers more chances of employment and well-off living standard for rural residents, which drives mechanic population into continuously fast growth. In the meantime, the municipality has not effectively controlled this trend, and has not given more considerations on the construction of public and municipal facilities to catch up with the trend.

(2) Non-integrated urban infrastructure construction. In recent years, the major concern on urban infrastructure construction has been focusing on power supply, telecommunication, and highway, in order to improve the "investment environment" for

inducing overseas investment and developing export-oriented economy. This is right. But we should know that the municipal facilities and public services that were neglected to enhance, are integrated to and are part of the "investment environment".

(3) Near-sighted profit seeking of investment. The construction investments have been concentrated on the projects that are short-term and thus can get immediate gains, or that go into a virtuous circle and thus can get long stable returns, for example, telecommunication and inter-city highways. The urban traffic system, however, nearly reaches its saturation point and can not be fully improved unless developing a grade separation traffic with overpasses and/or subway system. The funds for its construction, however, are too immense to be raised at present.

(4) Indifference to the environmental protection among some decision-makers. The environmental protection is considered as a "soft index" by some decision-makers. They hold the view that the environmental harnessing can not get much economic returns and thus need not be paid much attention to.

## 6 SUGGESTIONS ON SOLVING PROBLEMS OF DISCORDANT URBAN DEVELOPMENT

The above-mentioned discordant urban development phenomena often happened in the beginning stage of "economic take-off" in cities both at home and abroad. In other words, we can draw lessons from and find a better way to coordinate all the aspects of urban development.

The ultimate solution of those urban problems, of course, is to raise funds and investments in proportion with the economic development and population growth for "hardware" construction, i. e., for the construction of infrastructure, of municipal engineering, and of public facilities and services. But at the beginning stage of economic development in Xi'an, there are some difficulties for municipality to finance and allocate more funds for municipal construction. Thus there is room for a "software" solution.

In order to keep a high speed of economic develop-

ment and at the same time a sustained and coordinated urbanization process in Xi'an City, the following "software" solution, the "5R"-measure, seems to be feasible:

(1) Re-planning the urban and rural economic patterns. Make a reasonable division of labor force between urban and suburb and rural areas, establish a new system of satellite towns around Xi'an, and transfer the urbanization center from city proper to far suburb and rural areas so as to alleviate the pressure of urbanization in city proper.

(2) Regulating the population growth in city proper. Continue to pay close attention to the family planning in both urban and rural areas. Confine strictly the mechanic population growth in city proper, especially restrict the speed and scale of immigration of surplus labor force from the rural area to the urban.

(3) Raising more funds for urban construction from all over the society. Levy extra taxes from those enterprises gaining more benefits and those polluting environment seriously, to construct new and improve old urban infrastructure and public facilities and services such as public traffic, water supply, gas pipeline, concentrated heating system, residential housing, and public sanitation facilities.

(4) Reinforcing the municipal administration and management. Consummate the municipal laws and regulations and strengthen the rewards and punishments with reasonable economic weapons.

(5) Rejuvenating the urban ecological environment. Plant more trees and grasses in all over the city proper, and bring the air pollution, sewage pollution, rubbish and refuse pollution, and noise pollution under full control, so as to renew the appearance of Xi'an City greatly by improving the environmental quality.

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