

FOR THE WELL-OFF SOCIETY AND SUSTAINABLE DEVELOPMENT - PERSPECTIVES FOR ROAD TRANSPORTATION SYSTEM OF CHINA

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ABSTRACT

This paper describes perspectives for developing China's road transportation system, which echoes with the nation's policy for building a well-off society and promoting sustainable development. The paper firstly introduces current status of road transportation system in China and analyzes future socio-economic issues from 5 different aspects, based on which it illustrates basic considerations for initiating road transportation system planning and adjustment. After that, future road transportation system planning is introduced, including "National Highway System Planning", layout of transportation hub planning, and transportation development 10-year plan in West region. Finally, the paper discusses key issues in future road transportation development in China. It concludes that China's future road transportation system will be efficient, green, low-carbon, intelligent and open to public, thus to meet transportation demand and support China's social and economic development.

1. INTRODUCTION

Development of China's road transport industry is breathtaking, vigorous and influential. Since the 1990s, China's road industry has entered into a the greatest and fastest developing era in history. The scale of road infrastructure is continuing to expand; the total transport volume has been increasing steadily. The investment in the transportation system is considered as one of our country's most important investment priorities. Not only does a reliable and efficient transportation system support economic development, but it also provides mobility for an increasingly mobile Chinese population. [1]

The Chinese Government has made strategic policies to meet urgent demand brought by rapid economic development. To realize the goal of building a well-off society in all respects in 2020, and to form a sustainable development pattern, a road transportation system should be well designed. The paper will illustrates perspectives for developing China's road transportation system by the following 5 aspects: (1) current status of road transportation system in China; (2) analyzing social and economic issues and forecasting future development trends; (3) structure of road transportation system and basic considerations for initiating road transport system planning and readjustment; (4) future road transportation system plan; and (5) key issues in future transportation development.

2. CURRENT STATUS OF ROAD TRANSPORTATION SYSTEM

The development of road transportation system in China started at the beginning of 20th century. The first car was brought in China in 1902 and the first highway was constructed in 1906. Till 1949, total length of highway in China was about 81 thousand km.

China's road transportation system has experienced rapid development after the Reform and Opening-Up in 1978. The policy did not only boost economy, but also stimulated great demand for transport. Several transportation-related planning and researches, such as "National Trunk Highway Planning", "National Expressway Network Planning", and "Rural Highway Construction Planning", were formulated to guide the rapid development. Especially in 1998, in order to cope with the Asian Financial Crisis, infrastructure constructions were encouraged to stimulate economic development.

Up to 2010, China's road network extended roughly to 4 million km. The road density is about 42 km/100 km². Some municipalities and provinces, such as Shanghai, Henan, Shandong, even reach to 100 km/100 km², which is at the same level with major developed countries.

Outstanding achievements for China's road transportation development are illustrated in the following three aspects:

Firstly, the length of expressway in China increased rapidly. The average investment to expressway construction was about 35 billion U. S. dollars from 1998 to 2010. Total length of expressway reached to 74 thousand km by the end of 2010, which ranked no.2 in the world (Figure 1). And according to the "National Expressway Network Planning" (Figure 2), which was approved in 2004, the total length of national expressway will reach to 86 thousand km [2]. Most of cities with a population of more than 200 thousand will be connected by national expressway system. At the present time, development of the different areas is still unbalanced. In 2010, the expressway density of East area reached to 2.8 km/100 km², the Central area reached to 1.4 km/100 km². However, the West area was only 0.3 km/100 km². [3]

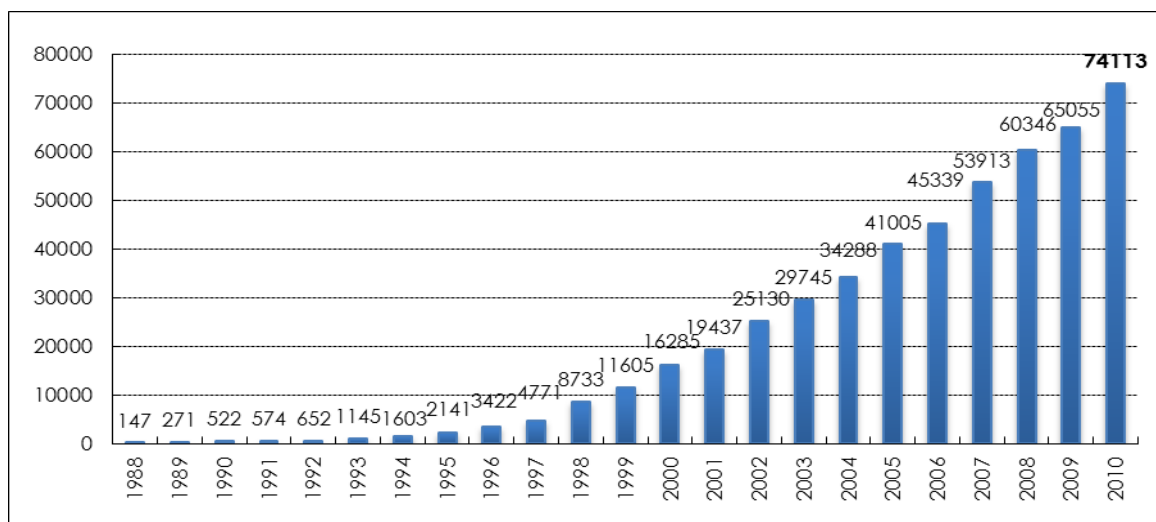


Figure 1- Expressway mileage in China from 1988 to 2010



Figure 2 - The National expressway network planning

Secondly, an initial road network was formed. Up to the end of 2010, all the national trunk highways in “National Trunk Highway Planning” (Figure 3) were built. Total length of these highways is about 35 thousand km, which includes 12 highways (5 vertical highways and 7 horizontal highways). [4]



Figure 3 – National trunk highway planning of China

Thirdly, the technical class of trunk highways increased steadily. In 2010, out of the total highway length, there were 450,000 kilometers of class II roads, taking up 11% of the total road system and 70% of the national and provincial roads.

Table 1 - Technical Classification of China's Road Transportation System

Mileage (km)		4008229
Technical Classification	Expressway	74113
	Class I	64430
	Class II	308743
	Class III	387967
	Class IV	2469456
	Unclassified	703520
Pavement Classification	Aspect concrete pavement	542457
	Cement concrete pavement	1375524
	Macadam pavement	524234
	Unpaved	1566014

Fourthly, investment to rural road has been increased. Rural road is an important part of road transportation network, which accounts for about 90% of the total. At the end of 2010, about 99.97% organic towns and 99.21% incorporated villages were linked by rural roads.

3. ANALYZING AND FORECASTING FUTURE DEVELOPMENT TREND IN CHINA

3.1. Steady and Rapid Economic Development

The reform and opening-up policy has greatly stimulated China's economic development. China's has grown to the fourth largest economy in the world, and its import and export volume, the third biggest.

Although confronted with complex environment challenges and grand risks, such as international financial crisis, China effectively dealt with its problems and maintained fast yet steady economic development, and for the long-term laid a sound basis for sustainable development. In 2010, the Gross Domestic Product was up to 5,800 billion U. S. dollars (figure 4). [5]

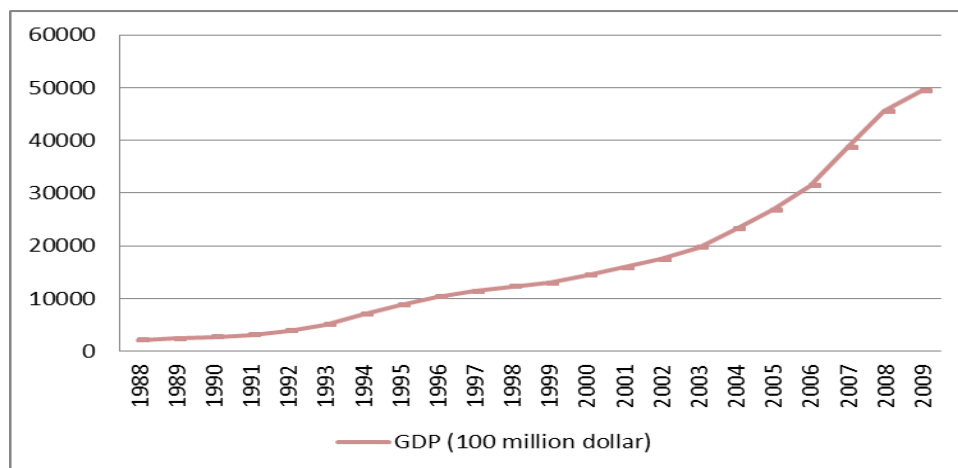


Figure 4 – GDP increase in China from 1988 to 2009

From a domestic perspective, factors favoring China's development still exist and the rapid and steady economic development trend has not changed. Industrialization, information, urbanization, marketization and internationalization are all intensifying. China's development will be still in an important period with more opportunities.

3.2. Urbanization Rapidly Promoted

From 2000 to 2010, urban population in China increased by about 200 million. The urbanization rate was up to 47.5% in 2010, which was lower than developed countries which were in the middle or late industrialization period. Figure 5 below shows the urbanization rate of China from 1949 to 2009. In future 20-30 years, China will actively yet prudently promote urbanization, increase its level, improve its pattern and forms, and constantly work to raise its quality. According to statistics, in 2020, China's urbanization rate will reach to 56%, and in 2030, to 62%-65%. At that time, the total urban population in China will reach to about 900 to 950 million. [5]

The number of cities in China is increasing with the growth of urban population. From 2001 to 2009, 30 more cities added to the list of large cities with a population between 500 thousand to 1 million; 7 more cities listed as megacities with a population between 1 million to 2 million; and 11 more cities fell into the category of super megacities with a population over 2 million. Population in medium-sized cities, large cities, megacities (population between 1 million to 2 million) and super megacities (population over 2 million) increased rapidly; the average increase rate was respectively 22%, 58%, 28% and 100%.

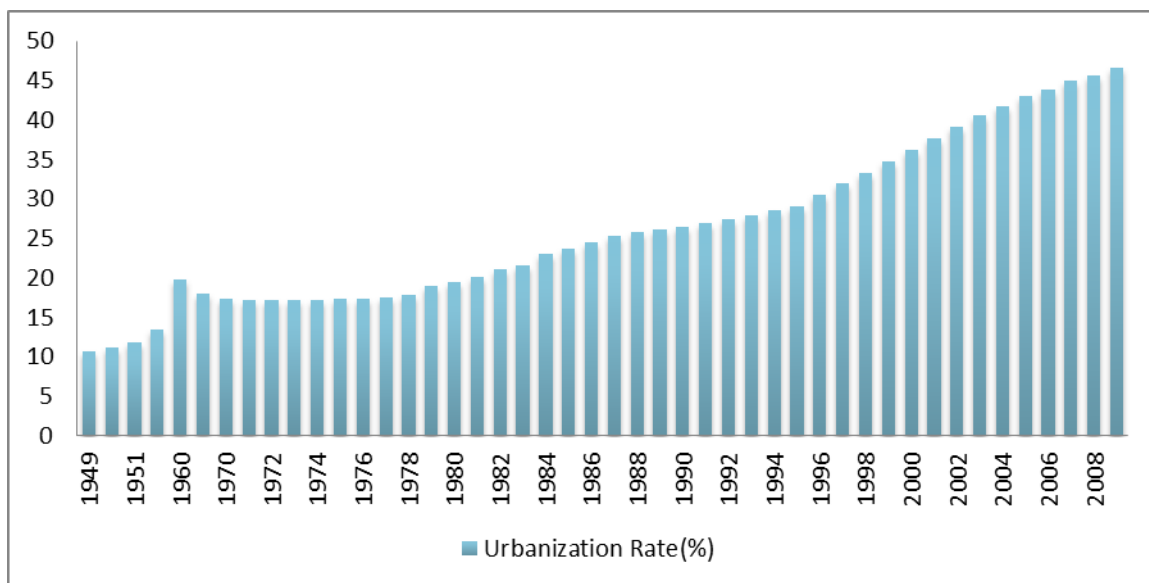


Figure 5 - Urbanization Rate of China from 1949 to 2009

3.3. Promote Balanced Development among Different Regions

A series regional development planning and regional development guideline were published. Subjects of these planning and guideline include: integration of regional

economy, regional cooperation development, ecological economic zone development, cyclic economic zone, urban agglomeration experimental areas, coastal economic zone, and international traveling island.

Now Chinese government is carrying out the strategy of “the West Developing Plan” and “Rising of the Middle Area”. More opportunities, resources will be distributed to the under-developed area. Economic development will be much faster. In 2015, the West region’s total economic volume will be doubled. And up to 2020, people’s living standard in the West region will be largely improved and the goal of building a Well-off society will be initially realized.

3.4. Promote the Process of Economic Globalization

Along 22,000 kilometers of land borders, China borders with fifteen neighboring countries including Russia, Mongolia, Democratic People’s Republic of Korea (DPRK), Kazakhstan, Tajikistan, Kyrgyzstan, Pakistan, Laos, Vietnam and etc, along 22,000 kilometers of land borders. In recent years China has signed eleven bilateral agreements and three multilateral agreements on international road transport with neighboring countries, with the aim of developing international road transport to meet the needs of international economic and trade cooperation, and facilitating the movement of people and freight between China and the neighboring countries.

The continuous growth of China’s domestic economy provides a solid basis for road transport. Considered as one of the main transport modes, road transport is able to address new challenges and provide solutions in a flexible manner.

Under the background of economic globalization, economic, trade and personnel exchanges between China and foreign countries have been steadily increasing. Road transport, as one of the major transport modes has been playing a significant role in promoting development of economy, trade, tourism, personnel exchange and social progress all over the world. Active participation in multilateral and regional economic cooperation is a major task as well as of great significance for China’s future development.

3.5. Accelerate Energy-saving and Environment-friendly Society

In Copenhagen UN Climate Change Conference 2009, China announced compulsory and verifiable targets for 2020 based on 2005 levels: bringing down CO₂ emissions per unit of GDP by 40 to 45 percents; increasing the proportion of non-fossil energy to 15 percents; and expanding forest coverage by 40 million hectares, which is more than 1.5 times the size of Britain.

Facing the increasingly energy and resource constraints, it is necessary to promote the awareness of developing green, low carbon economy. Since 2007, Chinese government published programs such as China National Climate Change Program and China’s Policies and Actions on Climate Change to promote low carbon economic development and bring

energy-saving practices to manufacturing, transportation, construction and other key sectors.

China combines the handling of climate change with its implementation of sustainable development strategy, with the aim of building an energy-saving and environmental-friendly society and constructing country with innovation concepts.

4. STRUCTURE OF ROAD TRANSPORTATION SYSTEM AND BASIC CONSIDERATIONS FOR PLANNING

In China, roads are classified into 4 classes by administrative responsibility: national roads, provincial roads, county roads, and township roads. In addition, there are special roads as well as rural roads. At present time, out of the 3.93 million km of highway length, there are 163,700 km of national roads (including 58,700 km of national expressways), 270,000 km of provincial roads, 550,000 km of county roads, 1,050,000 km of township roads, and 1,900,000 km of rural roads, which respectively took up 4.2%, 6.9%, 14%, 26.7% and 48.3% of the total highway length.

Presently, new planning of road transportation system are undertaken to build future road network in China in order to accord with future economic and society development. Basic considerations for initiating road transport system planning and adjustment are as follows:

Firstly, it should adapt to changes and challenges caused by economic and society development.

- Economy's rapid development brings travel demand increasing fast. Although impacts of international financial crisis are far-reaching and growth of the world economic is slowing down, economy in China sustained steady and rapid growth. In 2000, the economic development goal for 2020 was: GDP reaches to 4,000 billion U. S. dollars, GDP per capita reaches to 3,000 U. S. dollars. However, in 2010, GDP was 5,800 billion U. S. dollars; GDP per capita was 4,300 U. S. dollars, which realized the goal of 2020 ahead of 10 years.
- Fast urbanization process brings challenges. The distribution and size of cities is the key factor to impact road network planning. The process of urbanization will bring huge travel demand in China, for the consumption capacity of people in urban areas is 3 or 4 times than that in rural areas, and travel time per capita in urban areas is 8 or 9 times than that in rural areas.
- Economic globalization and Opening-Up Policy bring more challenges. International travel demand is increasing with economic globalization. More highways are needed to construct to connect China with other neighbor countries.

- Strategies like accelerating the transformation of economic development mode, paying more attention to improve the livelihood of the people, promote social fairness and justice, will bring new challenges for road transportation system planning and adjustment.

Secondly, road transportation service should be improved to meet the needs of people. As people’s living standard is keeping on improving, it is popular to own a car in China, especially for people living in urban areas. Meantime, leisure and travelling are becoming more important part in people’s daily life. At present time, car consumption is increasing rapidly. In 2010, the sales volume of motor vehicles was up to 18 million, ranking the top of world. The number of civil owned vehicles increased fast in recent years, shown as figure 6 [5]. At the end of 2010, the number of civil owned vehicles had reached 62.8 million. In estimation, to 2020, the number of civil owned vehicles will be over 200 million and the figure will reach to 300 million in 2030.

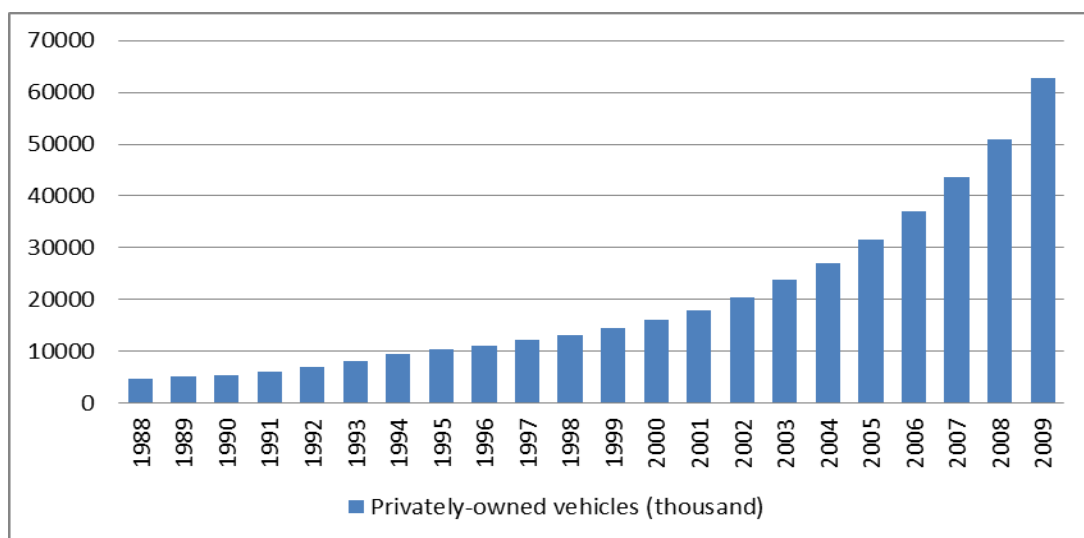


Figure 6 – Civil owned vehicles in China from 1988 to 2009

Thirdly, it should accord with comprehensive transportation development. A series planning about railway network, airport, port, inland river transportation development were approved by the State Council of China after the approval of National Expressway Network Planning in 2004. The planning will impact the road transportation system as well. In order to adapt to the comprehensive transportation development, road transportation system needs to be adjusted and improved.

Fourthly, it should adapt to self-development needs of road transportation system. The passengers volume transported by highway reached to about 27.8 billion and the road passengers transport sector performed about 1,351.1 billion passenger-kilometers, increasing 3.6% and 8.3% respectively compared to 2008. The volume of road freight transport reached to 21.3 billion tones and a corresponding amount about 3,718.9 billion ton-kilometers, which respectively increased by 11.0% and 13.1% compared to 2008. In 2030, it is estimated that the volume of road freight transport will be doubled or three folded. [5]

5. FUTURE ROAD TRANSPORTATION SYSTEM PLANNING

5.1. “National Highway System Planning”

There are two parts in national highway system, one is national expressway network and the other one is national highway network.

5.1.1 *National Expressway Network Planning*

The government approved the national expressway system in 2004, as shown in figure 2. The total expressway network was expected to be 85,000 km. This network is intended to link most cities with a population of more than 500,000. In addition, expressway extensions into the western provinces were aimed at increasing economic opportunity in this part of the country. However, in order to adapt to fast development status as introduced above, we are adjusting the National Expressway Network Planning now.

According to our initial planning, total length of the national expressway system will extend to 120,000 km. The National Expressway Network will contain 7 radial expressways around Beijing, 19 vertical expressways from north to south, 30 horizontal expressways from east to west, and some more short connecting expressways. The network will be intended to link all cities with a population of more than 200,000 instead of 500,000. Additionally, it will also link all cities which are administrative centers of prefecture-level region. After the network constructed, people living in East or Central area could access to the national expressway in 30 minutes by average, people living in West area may use 1 hours in average.

5.1.2 *National Highway Network Planning*

The National Highway Network is extended to 265,000 km from initial 105,000 km. This network contains 12 radial highways around Beijing, 52 vertical highways from north to south, 65 horizontal highways from east to west, and some more short connecting highways. It will link all county-level cities, border-crossing ports, and important ports.

5.2. Layout of Road Transportation Hubs

5.2.1 *“National Highway Transportation Hub Planning”*

The “National Highway Transportation Hub Planning” was issued by the then Ministry of Communications of China in 2007 [6]. 179 national highway transportation hubs were listed in the planning, including 12 comprehensive transportation hubs.

5.2.2 *Comprehensive Passenger Transportation Hub Planning*

The “Medium- and Long-Term Plan for Comprehensive Transportation Network” was issued by the government in 2007 [7]. In the planning, 42 comprehensive passenger transportation hubs were listed, located in Beijing, Shanghai, Tianjin and etc.

5.3. Transportation Development 10-year Plan in West Region

At the background of “the West Developing Planning” promoted by the central government,

the Ministry of Transport has formulated “Transportation Development 10-year Plan in West Region” to encourage transportation development in the west region. For road transportation in the west, 8 vertical and 8 horizontal trunk highways were planned to construct to form a highway network. These 16 highways will be constructed before 2020. [8]

6. KEY ISSUES IN TRANSPORTATION FUTURE DEVELOPMENT

In future, China’s transportation system does not only contain a road network with completed functions, but also attracts lots of attentions to set up a low-carbon, energy-saving, and green transportation system, promote intelligent transportation system development, and enhance international communication and cooperation.

6.1. Promote low-carbon transportation system

Transportation is a major source of greenhouse gas emission and the increasing emissions attract more attention. Technology could be used to achieve the goal of promoting low-carbon transportation system. Public transport is encouraged as a low-carbon consumption and travel pattern instead of developing car traveling.

6.2. Develop Intelligent Transportation System (ITS) in China

Intelligent transportation system is developed towards constructing a transportation system with better safety, efficiency, and quality. In road transportation, we need to enhance some management systems, such as highway maintenance management system, toll charging system, traffic survey system; promote electronic toll collection system; improve travel information service system and real-time information publishing system; develop online ticket sale system and electronic ticket; and promote E-port construction.

6.3. Enhance international communication and cooperation

In addition to international highway construction, port highway technical improvement, and international road transportation development, various platforms could be used to communicate with other countries to promote international cooperation and communications in fields of transportation planning, management, technology development, etc., thus to improve the “soft power” for China’s road transportation development.

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