Analysis and Prospect of the current Development of China's transportation industry: Based on the evaluation index system of transportation power

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Abstract—The transportation industry is the country's basic industry, in 2019, the State Council first proposed the transportation power development program. This paper introduces the background and current development of China's transportation industry, focusing on the evaluation index system of traffic strength, analyzes the current situation of China's transportation industry. The overall situation is large but not strong, and there is a certain gap compared with developed countries. Finally, the development trend of the transportation industry is prospected.

1. INTRODUCTION
The transportation industry is China's basic, pioneering and service industry[1]. It is an important part of the national economy and plays an important role in promoting the development of the national economy. Since the beginning of the 21st century, all countries in the world have a new development trend in transportation. The focus of transportation development in the United States tends to be multimodal transportation, clean development, livable communities, economic competitiveness and sustainable development of transportation. Every step of transportation development in the United States leads the world's transportation development trend. Many European countries have world leading traffic management systems in infrastructure, transport equipment and manufacturing. The EU sets standards for various modes of transport as well as for interoperable intermodal transport of dangerous goods and intelligent transport systems. The comprehensive innovation of Japan's transportation management system, industrial organization structure, scientific and technological human capital business model and business form has provided a positive promotion for the reform and innovation of Japan's transportation industry. Germany's transportation industry has the advantages of mature infrastructure and strict legal system. The federal government has changed the previous management mode, enhanced the utilization rate of existing resources, and increased financial support for the transportation system[2].

After more than 40 years of the reform and opening up, China has developed into a major country of transportation, such as road, railway, air logistics and transportation. By 2016, China has basically completed the construction of five vertical and five horizontal comprehensive transport channels, comprehensive transport network has formed scale; however, there is still a gap between China and developed countries in terms of infrastructure completeness, transportation cost control, level of service efficiency, intelligent transportation system and urban congestion. In the view of the problems existing in China's transportation industry, the Chinese Academy of Engineering has organized and set up several strategic research subjects of transportation power, such as passenger and cargo transportation...
demand forecast and future development situation analysis, traffic safety development strategy research, and transportation equipment and system innovation strategy research.

This paper focuses on the main problems of China's transportation industry to analyze the next stage of development, and put forward the prospects of China's transportation industry.

2. THE PROPOSAL OF TRAFFIC POWER STRATEGY

The 19th National Congress of the Communist Party of China has established the goal of building China into a powerful transportation country. It is the first time that the Congress mentioned the construction of a powerful transportation country. The State Council put forward an outline for building a transport power in 2019, with a three-step development goal. The first step is to complete the tasks of securing a decisive victory in building a moderately prosperous society in all respects and the tasks of the 13th Five-Year Plan for the development of a modern comprehensive transportation system by 2020, laying a solid foundation for the construction of a transportation power. Secondly, from 2021 to the middle of this century, we will push forward the construction of a transportation power in two stages. Thirdly, by 2035, China will become a major power in capital construction transportation. The development of a modern and comprehensive transportation system will have taken shape.

Transportation and the development of intelligent, safe, green and shared transportation will have been significantly improved. The international competitiveness and influence of transportation have been significantly improved.

2.1. Power Evaluation Index System

Traffic power index system based on traffic power construction outline of China's transportation industry development present situation, China Communications Transport 2018, at the same time, the development of reference to other foreign countries at present situation, and other indicators have correlation and comparative. According to the basic national conditions of China's transportation industry, five first-level indexes and twenty second-level indexes are set up. The primary indicator is safe, convenient, efficient, green and economy. Secondary indicators include road traffic fatality rate, emergency response time, 123 transportation circle population coverage, 300 meters urban bus stations coverage, global accessibility of transportation services, rural public transport rate, etc.

2.2. Follow-up Work

The Ministry of Transport issued the opinions on comprehensively and deeply promoting the development of green transport in 2017. The 2018 National Transport Work Conference, which held on December 25, 2017, further focused on the strategic goal of making China a transport power and clarified the goals and tasks of China's transport development in the coming years. In 2018, a number of deputies to the National People's Congress and the members of the Chinese People's Political Consultative Conference have put forward proposals to continue deepening the reform of the supply-side structure of transport, reduce costs, strengthen weak links, improve services, improve the environment, and increase momentum for high-quality transport development. The minister of The Ministry of Transport and the secretary of the Party Leading Group have put forward tasks and schedules for rural road construction. The study on the strategy of strengthening China's transport sector, compiled by the Chinese Academy of Engineering and the Ministry of Transport, was published in 2019. The provincial transportation departments of China have also started the pilot and research on the construction of a transportation power. Until recently, Shaanxi, Hubei, Jiangsu, Zhejiang, Shanxi, Sichuan, Hunan and other provinces have combined their own advantages and disadvantages to form a plan of transportation power which based on the strategic deployment. Subsequently, the ministry of transport issued the division of labor plan for the construction of a transportation power; we will draw up the Outline of the National Comprehensive Three-dimensional Transport Network Plan (2021-2050), and simultaneously launch the formulation of the 14th Five-Year Plan comprehensive transport development plan. We will accelerate the building of railways, highways, waterways, civil aviation,
 postal services and other services. The Ministry of Finance, the National Development, Reform Commission and other 7 departments jointly issued guidelines on the construction of world-class ports. In October and December, 2019, the Ministry of Transport has identified a total of 34 pilot projects in two batches and 23 major project packages are proposed.

3. **ANALYSIS OF CHINA’S TRANSPORTATION INDUSTRY BASED ON EVALUATION INDEX SYSTEM**

In recent years, China's transportation industry has undergone earth-shaking changes. By 2018, China had 131,700 km of railways in operation, 484.65 km of highways, 142,600 km of expressways, 127,100 km of inland waterways, 8,379,800 km of regular routes, 122,300 km of oil and gas pipelines, and 180 million private cars. The development of the transportation industry has completely changed the original problem of people's travel. Although China occupies the first place in the world in these hardware indexes above, however, the population base of our country is large, and there is still a certain gap between the per capita indicators and the goal of transportation power, especially a large gap with developed countries in the world. The following analysis of the current situation of China's transportation industry is based on the evaluation index of transportation power.

3.1. **Road Transportation Safety**

| countries | The number road traffic deaths in recent three years | Ten thousand vehicle fatality rate |
|-----------|-----------------------------------------------|-----------------------------------|
|           | 2016  | 2017  | 2018  |                      |                      |
| America   | 37461 | 37133 | 36560 | 1.77                |
| Germany   | 2969  | 3214  |       | 0.61                |
| Japan     | 3694  | 3904  | 3532  | 0.77                |
| China     | 69093 | 63772 | 63194 | 6.2                 |

We can see from the table above, from 2016 to 2018, the average number of road traffic deaths in the United States was 37,051, compared with 3,091 in Germany, 3,710 in Japan and 65,353 in China. The 10,000 vehicle mortality rates in the United States, Germany, Japan and China were 1.77, 0.61, 0.77 and 6.2, respectively. The number of road traffic deaths in China is very large, especially the 10,000 vehicle mortality rate is 4 to 8 times higher than in other developed countries. Germany has a highly developed road system. It is the first country in the world to build an expressway. The expressway has no speed limit, but its road traffic death rate is the lowest in the world. The number of cars in China has increased from 16 million in 2000 to 240 million in 2019. The growth rate is 15 times. However, the number of road traffic deaths in China dropped from nearly 100,000 in 2000 to 52,388 in 2019. It can be seen that China's road traffic accident incidence shows a downward trend. This is inseparable from the gradual improvement of China's road traffic laws and regulations, and the overall rising trend of the quality of all citizens. But the gap with developed countries is still quite obvious.

In terms of emergency response, the State Council of China issued the national general emergency response plan for public emergencies as early as 2006, and put forward the emergency response capacity plan for special major accidents. The national emergency management system has initially built, and the emergency management regulation system has been basically established. Emergency management offices have also been set up in each province to strengthen the emergency support capacity of each region. Previously, China has gradually developed the use of satellite remote sensing
and other advanced technologies for the detection and evaluation of road disasters. This makes a certain contribution to reducing the loss of road traffic. At present, the United States, Japan, Australia and Germany have formed their own distinctive systems and mechanisms. However, the construction of China's emergency management system is relatively late and not perfect.

3.2. The Degree of Convenient Transportation

Abroad, the Tokyo Metropolitan Area, the London Metropolitan Area and the New York Metropolitan Area are relatively famous metropolitan areas in the world. The average one-way commute time in the metropolitan areas of London, New York, Paris and Tokyo is respectively 43, 40, 38 and 69 minutes. In China, the average commute time in Beijing, Shanghai and Chongqing in China is 56, 54 and 54 minutes, and the above statistics do not include cross-city commuting. At present, China's Beijing, Shanghai, Guangzhou, Hangzhou, Xi'an, Zhengzhou and other cities have determined the task planning of building 123 traffic circle, which is in the initial stage of construction. By 2017, the city's 500-meter site coverage exceeded 80% in 11 cities, including Shenzhen, Shanghai and Chengdu. In 24 cities, such as Jinhua, Dongguan and Ningbo, the city's 500-meter site coverage exceeded 70%. There is still a gap between this and the coverage of 300-meter stations. In traffic construction, it is necessary to optimize the urban public transport system and further increase the density of line network.

Among the 50 most connected hubs in the world, the United States is the absolute leader in 2015. Eight of the top 10 were from the United States. However, China's Shanghai Pudong Airport was ranked 31st, China's Capital airport was ranked 47th, Kunming Changshui Airport was ranked 48th and Hong Kong Airport was ranked 41st. In 2017, Shanghai Pudong International Airport was the most internationally connected airport on the Chinese mainland, which was ranked 24th. Guangzhou Baiyun Airport was ranked 31st and Beijing Capital Airport was ranked 32nd. It can be seen that China's aviation industry has made some progress in recent years, but the development of global routes is not perfect enough to reach the world's leading level. Therefore, China's air transportation needs to be greatly improved.

3.3. Road Operation Efficiency Analysis

In 2018, Mumbai in India was the most congested city in the world, with a 61 percent congestion rate. Among the top 100 congested cities, 13 cities are in China. China's Chongqing, Guangzhou, Zhuhai and Beijing are the most congested cities, with respectively ranking 18th, 20th, 23rd and 30th. In Japan, only Tokyo and Nagoya were ranked high, with respectively ranking 25th and 71st. In America, Los Angeles, New York, San Francisco, San Jose and Seattle were ranked respectively 24th, 42th, 55th, 80th and 95th. No German city made the list. Take Japan as an example, in 2017, its population's density was about 347.8 people/km2, that is twice of China, but its traffic congestion was not significant. It can be seen that China's traffic congestion is relatively serious, and the problem of traffic congestion needs to be urgently solved and improved.

In addition, China is also extremely short of parking spaces; At present, the ratio of cars to parking spaces in big cities is about 1:0.8, in small and medium-sized cities is about 1:0.5, but in developed countries it is about 1:1.3. According to the statistics, the gap of parking spaces in China exceeds 50 million. The shortage of parking spaces leads to disorderly parking, serious traffic congestion, environmental pollution and other problems.

3.4. Green Intensity Analysis of Transportation

In the 1890s, the United States, the European Union, the United Kingdom and other countries have developed green transport legislation and related policies from the perspective of sustainable development, which can increase support for public transportation, and pay attention to the ability of science and technology to save energy and reduce emissions. Republic of China on highway and waterway transportation" in 2008 in view of the green development law of transportation in China. There is a lack of guarantee policies. The green transportation evaluation system is not perfect. Vehicle and ship in most areas greatly hinder the development of green transportation. With the gradual
improvement of the construction of public transport, it plays a key role in green travel. However, the number of cars in China ranks first in the world, and the use of new energy vehicles has just started. By the end of 2018, the global sales of new energy vehicles reached 5.5 million, with China accounting for more than 53 percent. This indicates that Chinese people's awareness of environmental protection has been gradually improved, but the overall calculation ratio is low.

3.5. Transportation Cost Analysis
From 2012 to 2017, the ratio of China's total social logistics expenses to its GDP dropped for five consecutive years, from 18% to 14.6%. It indicated that China's social logistics expenses are gradually rationalizing. According to statistics, in 2018, the total logistics expenses in the US accounted for 8.0% of GDP, Japan is 8.7%, and China is 14.8% [3]. It can be seen that China's transport costs are higher, obviously this phenomenon and China's existing basic national conditions have a close relationship. However, compared with other countries, China's transportation costs have a larger space to reduce. With advanced operation and management methods, the principle of whole-process management shall be adopted for engineering projects. We should constantly improve the comprehensive quality of transportation enterprises and the quality of the whole people. It is of great significance to reduce the cost of transportation.

4. Suggestions and Prospects

4.1. Policy Advice
Since the reform and opening up more than 40 years ago, China's transportation industry has undergone earth-shaking changes. The length of expressways in China has reached 142,600 kilometers since there were no expressways. It can be seen from the above data that China's transportation industry has ranked the first in the world on the overall scale, but there is a big difference between China and developed countries in terms of quality. Therefore, the following suggestions are made for the construction of China's transportation power.

(a) In terms of government policies, the government shall formulate and implement policies to strengthen China's transportation industry, and promote the coordinated development of China's transportation industry. The government should also provide a good environment for the development of the transportation industry, and shorten the gap between the east and the west as well as the differences between cities and rural areas. Actively to absorb the advanced technology and management ideas of other developed countries, it can improve China's relevant road transport laws and regulations. We should improve China's road traffic laws and regulations, and also establish a strict traffic monitoring system, and especially strengthen the legal mechanism of electric bicycles, motorcycles and electric tricycles. Starting from the foundation, efforts should be made to improve the quality and safety awareness of the whole people. In the emergency management, we should strengthen the prevention awareness of the whole people, improve the social participation mechanism, and let the whole society participate in the emergency guarantee.

(b) From the technical aspect of transportation, it is important to develop in an intelligent and green direction. The state should gradually improve the policies and regulations on the green development of transportation and a certain scale of management system, and formulate an incentive mechanism for energy conservation and emission reduction [4]. Intelligent reflects the development direction of transportation, which can better solve energy and environmental problems of safe transportation and efficiency, and also promote timely, accurate and efficient transportation in a large range. Green from the perspective of sustainable development, China's transport industry will develop from the low-end to high-end industry. The state should strengthen communication and cooperation with research institutes, and attach importance to the training of researchers to strengthen the independent research and development in the field of transportation. We will build our own brand with Chinese characteristics and high-end green transportation.
(c) From the transportation scale level, we should improve the transportation network, and form a transportation system with a certain scale. It is important to give prominence to convenient travel, and also pay attention to the intercommunication between metro bus and rail transit. We should appropriately introduce social capital and consider using PPP investment and financing mode to build urban transportation industry, so as to provide certain reference for the sustainable financial development of national public utilities[5]. For the current construction of the weak points, the state should strengthen the construction of comprehensive pipe gallery project in each city, and strive to improve the competitiveness of civil aviation services in the international market, and develop low-carbon transportation. We should promote the construction and operation management of public transportation infrastructure, handle the division of labor between urban roads and rail infrastructure, improve the service level of Shared bikes, plan urban bicycle lanes and strengthen the construction of parking spaces, and form a modern road transportation system. That is suitable for China's national conditions, convenient and efficient.

4.2. Future Prospects

First of all, the evaluation system should be integrated with the development of China's transportation and constantly improve the innovation, and also should be combined with China's actual national conditions. In view of the problems existing in China's transportation industry, the safety of people's life and property is still the primary task of transportation. Various policies and measures have been adopted to reduce the road traffic mortality rate and strengthen the emergency guarantee mechanism for emergencies. Secondly, in terms of the development and construction technology of civil aircraft and automobiles in China, we should focus on the training of scientific research talents, so that the development of technology and industry can go hand in hand and develop in a coordinated way. In addition, there is an old saying in China that if you want to get rich, build roads first, which is enough to see that the importance of road construction to the national economy, especially the economic development of remote areas. The state should formulate relevant policies to guarantee the construction of rural transportation and gradually shorten the gap between the rich and the poor. By promoting the deep integration of the Internet big data and artificial intelligence with the transportation industry, China's transportation industry is promoted to lead the world[6].

5. Conclusion

There is a long way to go in the construction of a transportation power, which is a long-term construction process. It requires the participation of the whole society. All sectors of society have reached consensus on the construction. In order to realize the transportation power at an early date, we should make joint efforts to form a three-in-one pattern of comprehensive development of water, land and air, so as to achieve the goal of a transportation power at all levels.

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