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Study on Urban Transportation Planning and Problems in Shanghai

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Abstract

Over the past two decades, Shanghai has achieved sustained and rapid social and economic development. In the next two decades, this trend will be continued and consolidated, which will bring more wealth and higher quality of life to Shanghai residents. At the same time, Shanghai's urban transport will face good development opportunities, and its supporting role in Shanghai's construction of an international metropolis will be further highlighted. Starting from the development of Shanghai's urban traffic, this paper analyses the problems faced by Shanghai's traffic and its future development trend, and draws on the development experience of advanced transportation cities in the world, puts forward corresponding countermeasures and suggestions for the planning and development of Shanghai's urban traffic.

Keywords

Shanghai; Urban Transportation; Development Planning; Problems; Countermeasures.

1. Introduction

Traffic is one of the important driving forces for sustainable urban transformation.[1] Research shows that traffic network development could influence the change of land use during the urbanization process.[2]In many developed cities, aging infrastructure, including traffic networks, cannot meet the needs of citizens, infrastructure is in urgent need of improvement, and the cost to alleviate these urban problems are often prohibitively expensive.[3]Alternative sustainable urban transportation planning strategies could facilitate quality of life and urban sustainability.[4]

1.1 Basic concepts and evaluation criteria of urban transportation

Urban traffic, public travel between urban road systems and passenger and cargo transportation. Due to the differences in the size, nature, structure, geographical location and political and economic status of the city, they all have their own characteristics, but they all focus on passenger transport and form a peak passenger traffic in the morning and evening hours.

1.2 Composition of Urban Transportation

Urban transport consists of three parts: private transport, urban public transport and professional transport of goods.

Private transportation includes hiking and self-use vehicles. There are cars, motorcycles, bicycles and so on. Private transportation is flexible, convenient for people to travel, and can be directly from the starting point to the destination. However, the development of self-use vehicles will bring traffic congestion and congestion to the city, make the average speed of vehicles decreasing, noise and air pollution becoming more and more serious, increase energy consumption, and seriously insufficient parking space. Therefore, private transport should be properly controlled in large and medium-sized

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cities, only as an auxiliary mode of urban public transport. Private transport can be developed in small cities with less concentrated industries.

Urban public transport is for passengers. Passenger transport tools include buses, trams, trolleys, underground railways, taxis and so on. With the development of cities, railway suburban passenger transport has also become an important part of the public transport structure in some cities. On the basis of technical transformation of tramcar, a kind of fast tramcar has been developed. It can be operated on elevated lines or transferred to underground. It does not interfere with other vehicles in busy urban areas. It has high speed, large load and comfortable ride. In modern big cities, underground railway and fast tram have gradually developed into the backbone of urban traffic. The operation modes of urban public transport usually include fixed-line and fixed-station services, fixed-line and indefinite-station services (such as minibuses in Beijing and Guangzhou) and indefinite-line and indefinite-station services (such as taxis). Public transport has the advantages of large capacity, high transport efficiency, low energy consumption, low relative pollution and low transport cost. Therefore, giving priority to the development of urban public transport is not only a measure to solve urban traffic congestion and congestion, but also an important way to save energy, reduce pollution and improve the urban environment.

Professional transport of goods is operated by transport enterprises with specialized means of transport. It has high transportation efficiency and low cargo damage rate. The development of specialized freight transportation facilitates the allocation of vehicles for cargo, and reduces the empty driving of vehicles through reasonable planning and scheduling, improves the utilization ratio of vehicles 'travel and equipment, thus greatly saving transportation capacity investment, effectively reducing urban traffic flow, saving energy and reducing freight costs.

2. UrbanTransportationDevelopment and Main Problems in Shanghai

2.1 Urban Transportation Development in Shanghai

2.1.1 Urban Development

Shanghai has formed a super-large-scale comprehensive transportation network consisting of five modes of transportation, namely, railways, waterways, highways, aviation and railways.

Shanghai Port is one of the largest hub ports in China, with 35 passenger stations and 1611 long-distance flights, reaching 660 locations in 14 provinces and municipalities. Shanghai has formed a three-dimensional urban traffic network consisting of ground roads, elevated roads, river-crossing tunnels and bridges, as well as metro and elevated rail transit.

Shanghai's three major railway stations: Shanghai Railway Station, Shanghai Hongqiao Railway Station and Shanghai South Railway Station. Shanghai Hongqiao Railway Station is the largest and most modern railway passenger station in Shanghai. Shanghai Hongqiao Integrated Transportation Hub is the first high-speed railway and airport integration in the world. The northern end of Shanghai Hongqiao Station is connected with Beijing-Shanghai High-speed Railway and Shanghai-Hanrong High-speed Railway, while the southern end is connected with Shanghai-Kunming High-speed Railway and Shanghai-Hangzhou-Yong Passenger Dedicated Line. It is a part of Shanghai Hongqiao Comprehensive Transportation Hub and the most important and largest railway passenger transport hub in East China.

2.1.2 Urban Transportation Development in Shanghai

(1) Accelerating traffic integration in the Yangtze River Delta. Focus on promoting the connection with the backbone road network and regional road network of Jiangsu and Zhejiang provinces, the backbone road network focuses on promoting the construction of S7, G228, G320 and other highways, and the S26 main line has been completed and opened to traffic. Regional road network actively promotes the construction of provincial break roads such as Yexin Highway. We will coordinate and promote the construction of regional green ports, focusing on strengthening cooperation in areas such as ship emission control zones and the application of new energy ships. We will promote the exchange

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and sharing of information related to expressway operation and management. Strengthen joint defense and joint control of highly polluted vehicles and "two passengers and one dangerous" vehicles.

(2) Promoting the construction of major projects. In 2018, the city has 50 major transportation projects (76). In 2018, the third phase expansion of Pudong Airport will be promoted, and the renovation projects of the fifth runway of Pudong Airport and the T1 terminal of Hongqiao Airport will be completed. We will accelerate the construction of Shanghai Section of the Shanghai-Tong Railway Phase I (Nantong-Anting), and strive to start the construction of Shanghai Section of the Shanghai-Tong Railway Phase II (Taicang-Fourth Regiment). Promote the preliminary work of Shanghai-Suhu Railway. We will promote the construction of the Beiheng Passage, Kunyang Road, Zhoujiazui Road and other road crossing tunnels. The Jiamin Elevated South Extension Ground Road and Zhongshan South Road Ground Road will be opened to traffic. We will promote the construction of regional docking roads, open 10 roads such as Weiniu North Road, Wuxuan Road and Dongming Road, and promote the construction of 37 roads. Promote the construction of "Four Good Rural Roads", optimize the road network structure of rural roads, improve the quality of management and maintenance and road environment.

(3) Promoting comprehensive traffic management to make up for shortcomings. Sixty congestion alleviation projects, 20 kilometers of bus lanes and 18 slow traffic improvements were promoted. Create 100 parking resource sharing projects. We will continue to adjust the price of public parking fees and strictly control the setting of parking spaces on major roads. Strengthen and improve slow traffic management, encourage and standardize the development of Internet bicycle rental.

(4) Promoting the development of intelligent transportation green transportation. Improve the intelligent transportation travel APP service, improve the information coverage, improve the public's feeling and experience. Continue to increase the proportion of new energy buses. Promote the development of new energy vehicle time-sharing leasing industry, improve the layout of charging facilities for new energy vehicles, build 4,000 new public charging piles, and achieve 103,000 charging facilities in the city. We will continue to implement measures for the control and management of ship discharge control zones and accelerate the construction of quayside power in Shanghai Port. We will intensify pollution control of dust-raising wharfs and non-road mobile machinery in the harbor, and strive for a total of 2500 LNG trucks, 90% of which will be used by new LNG trucks in the harbor.

(5) To ensure the safety and stability of the industry in an all-round way. Continue to maintain the high-pressure situation of "fighting against illegal activities". Strengthen the safety management of rail transit operation, make full use of new technology and new means to strengthen scientific and efficient management. Strengthen the safety management of "two passengers and one danger" transportation, and further promote the operation of the third-party supervision platform mechanism. We will strengthen comprehensive management of illegal passenger transport and intensify efforts to rectify excessive transport.

2.2 Main Problems of Urban Transportation in Shanghai

Overall, on the one hand, the hierarchical structure of China's urban traffic planning system is not clear, the strategic and key strategies of urban comprehensive traffic planning and the implementation of special plans are not effectively unified, there are dislocations or disjoints. It is suggested that the main urban traffic planning in China should be included in the scope of statutory planning. To ensure the implementation of urban traffic development concepts and measures.

2.2.1 The attractiveness of public transport declined

As we all know, bus and car have great advantages in calculating traffic volume by person. Among the four main modes of transportation, walking, bicycle, public transport and car, corresponding to the same passenger traffic volume, the road area required by public transport is a few times larger than that of other modes. With the increase of population and industrial activities, people's traffic is becoming more and more frequent, which is inevitable. However, the pressure on urban traffic is

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quite different when people use different means of transportation. According to estimates, if the road area required by public transport is 1, it will take 5 - 7 by bicycle, 15 - 25 by car, and even three times more by foot than by bus. This fully shows that public transport is the most economical mode of transportation for road resources. But according to the current situation, the probability of Shanghai citizens traveling by bus is not very high.

2.2.2 Road traffic pressure is high

At present, the ground traffic situation in the Central District of Shanghai has been improved. With the improvement of the skeleton road construction in the urban area and the completion of some important road reconstruction projects, the traffic capacity of the urban road network has been greatly improved. At the same time, the level of traffic management has been improved, including the ability to respond to traffic emergencies and traffic informatization. The level of management and the corresponding management during road construction have been improved on average. In addition, with the promotion of urban renewal and housing reform policies, some residents have moved to the periphery of the city, and the pressure of ground traffic in the urban center has been alleviated compared with previous years. But at the same time, the traffic pressure in the periphery area is becoming more and more serious. Because of the expansion of the built-up area of the city and the migration of residents in the central area, the traffic demand in the periphery area is increasing day by day, and the traffic problems in the periphery area are becoming more and more serious. According to statistics, the daily and peak traffic volume of the Inner Ring Elevated Line increased to a certain extent in 1998 compared with 1995. In the peak period, many survey points are in supersaturated or saturated state, which indicates that the traffic flow of the elevated loop line is in a crowded state during the peak period. []

2.2.3 The traffic environment is not ideal

The great demand for passenger transport and the actual situation of urban roads in Shanghai make it necessary for Shanghai to take "public transport priority" as the basic policy to solve the problem of urban passenger transport. At the same time, the construction of large-capacity urban rail transit system should be accelerated to form a passenger transport network with rail transit as the backbone and ground public transport as the basis. 。 In the central city, supplemented by the control of private cars and motorcycles, the administration and economy of fuel-assisted motor vehicles will be phased out.

3. Development Experience of World Large-scale Urban Transportation Planning

3.1 Urban Transportation Planning in Singapore

Singapore has developed rapidly since its founding in 1965 and has gradually become a newly developed country.. Singapore's advanced transportation system is a model for major cities in the world to learn from.. Singapore, together with Tokyo, Paris, London, Hong Kong, Seoul, Stockholm and Copenhagen, is known as the world's eight largest bus cities. Singapore has a rail transit network of 152.9 kilometers of subway and 28.8 kilometers of light rail; more than 310 bus routes, about 4,000 bus vehicles, and more than 27,000 taxis. In 2012, 63% of Singapore's early peak public transport trips accounted for motorized trips, and its car ownership certificate system, road electronic toll collection system and other means of traffic demand management were also very successful.

Another feature of Singapore's road network is its clear hierarchical structure and orderly hierarchical optimization, which achieves the diversion of different vehicles, and uses the road mode of combining curve road (circular branch) and discontinuous road (T-intersection, end-to-end road) to control the speed and traffic volume of motor vehicles within the group. To adopt pleasant pedestrian scale to plan residential roads, guide people's way of travel, and encourage slow traffic.

Singapore has constructed a multi-mode integrated public transport system with rail transit as the leading link, light rail and public bus as the connecting link. It also encourages passengers to transfer

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between various modes of public transport and promotes the use of public transport through such measures as facilities integration, ticket system and fare integration, and operation and management integration.

3.2 Advantages of Urban Traffic Planning in Tokyo

Advantages 1: With the development of the city, the greatest feature of Japan's urban railway construction is to build railway first and rebuild the city. The same is true in Tokyo. As a result, residential areas are radiated around railway stations, providing urban rail transport with high accessibility for residents to travel. This is also the reason why people think that the metropolitan railway system in Tokyo is very convenient.

Advantages 2: The combination of railway stations and commerce. A common feature of railway stations in Japan's metropolitan areas is the good combination with commercial facilities, which makes the integration of transportation and Commerce convenient for residents' lives. The same is true of metropolitan railways in Tokyo.

Advantages 3: Good technical support .The efficient operation of urban railway system depends on the support of good technology. The technology here includes excellent railway vehicle, communication signal system, railway track system, automatic ticket checking system, efficient dispatching and traffic management, good station service, etc.

3.3 Lessons from Hong Kong's Traffic Planning

Hong Kong's roads are narrow but convenient. The most fundamental reason is that the urban master plan is advanced, scientific and legal, the rationality and timeliness of urban regulation and regulation, and the seriousness and authority of urban planning law enforcement. Hong Kong's urban planning can be divided into four levels: the development strategy, statutory plans, departmental plans and Hong Kong Planning Standards and Guidelines, which are suitable for the overall urban planning, zoning planning, special planning and regulatory detailed planning. The specific practice is that no construction projects will be examined and approved before the special plan is approved.

4. Suggestions on Urban Transportation Development in Shanghai

4.1 Vigorously Develop "Charming Bus"

It is self-evident that the development of "charming bus" can greatly enhance the attraction of public transport, increase the proportion of public transport trips in urban traffic, reduce car trips, thus improving urban traffic congestion and other issues, and achieve the sustainable development of transport. Especially for the improvement of traffic in metropolitan and old urban areas, it has great significance and value.

4.2 Development of Multi-mode and Multi-combination Public Transport System

Due to the diversity of passengers'demands on travel distance and travel time, if we want to improve the service level, it will inevitably be accompanied by large investment. Therefore, based on the traveler's needs and the characteristics of service chain, we should take the construction of active service-oriented bus system which can compete with cars as the goal, with financial sustainability as the constraint, and develop greatly. Small transport capacity, long and short distance, speed coordination, and high flexibility of multi-mode and multi-combination bus system. Therefore, the more congested areas are, the more public transport (such as Shenzi Elevated Road in Shanghai or North-South Elevated Road) should be laid out. It is advisable to explore the setting of bus lanes or high-speed passenger vehicles (such as the development of multi-mode and multi-combination bus system, another key is to deal with the transfer problem finely, which should be fully done in time, space and ticket system). To "zero transfer" and ensure the reliability of the bus system; on the other hand, we should fully "learn" from the black car, from the customized business car, and from the "drip taxi system" and "learn", believing that some experience is extremely valuable and worth learning!

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4.3 Grasp "Parking Traffic" to Static Brake

When we vigorously develop the charming bus system that can compete with cars, we will surely attract a large number of traffic travelers to abandon self-driving and use public transport to travel. However, no matter how attractive the bus is, there are still many natural disadvantages compared with the car. Therefore, it is necessary to adopt demand management for the car traffic synchronously. One of its significances is to reduce the demand for car travel by reducing parking space or increasing parking cost, and promote its turning to use public transport, thereby alleviating the contradiction between supply and demand of traffic in order to improve traffic; the other is to clear up the occupied public space and even lanes by sorting out all the contradictions between supply and demand of parking in the city. The parking problem of road resources should be remedied so as to minimize the impact of parking traffic on dynamic traffic, improve road capacity, and ensure the function of community disaster relief and rescue corridors. Significance 3: By properly arranging parking points, car or electric bicycle or EMU can be parked and transferred to public transport. And increase the utilization of public transport; Fourth, the ownership or rental of parking spaces as a condition for the purchase of vehicle licenses can not only reduce the blindness of car purchasing without parking spaces, but also reduce the ownership of vehicles, and further promote the integration and comprehensive utilization of social parking space resources.

4.4 Speeding up the Construction of Railway External Corridors and Railway Hubs

Pushing forward the construction of Shanghai-Tong (Nantong-Anting and Taicang-Situan) Railway and the electrification transformation of Pudong Railway Complex Line, building the new Shanghai-Hangzhou Passenger Dedicated Line 34 (Xinzhuang-Shanghai South Railway Station), Shanghai-Suhu and Shanghai-Chahang Railways, and building the east railway station to form the main passenger transport hub of Hongqiao Station, Shanghai Station, Shanghai South Railway Station and Shanghai East Railway Station. Bureau; Construction of Waigaoqiao Container Center Station on Railway to create conditions for the development of sea-rail intermodal transport.

4.5 Continue to build and improve rail transit network

To build a multi-level rail transit system and form a network of multi-mode (city line, city line, local area line). Make full use of existing and planned railways to develop suburban railways and provide fast services for suburbs and adjacent areas of the Yangtze River Delta. Continue to promote the construction of rail transit network, 216 km, and by 2020, the total mileage will be about 800 km. Combining with the recent construction plan of the new round of rail transit, we will deepen the West extension of line 13, line 19, line 20, Airport Express line, Jiamin line, Chongming line, line 21, line 23 and other lines of rail transit. Research and preliminary work, timely start construction. We will promote the construction of the tram network and projects in the new city.

4.6 Further Improve Taxi Service Level

We should adhere to the total taxi control, adjust the total taxi scale according to the development of regional economy and society and the travel demand of citizens, taking into account the mileage utilization rate and market conditions. Continuously optimize taxi services, strengthen the construction of ancillary facilities such as electricity regulation platform and passenger waiting stations, guide the application of intelligent terminals, improve the efficiency of taxi operation, rectify illegal passenger vehicles, and create a standardized, fair and orderly market environment. We should adhere to the total taxi control, adjust the total taxi scale according to the development of regional economy and society and the travel demand of citizens, taking into account the mileage utilization rate and market conditions. We will gradually realize the term limit of the right to operate. We will further improve the taxi fare formation mechanism, give full play to its leverage in regulating supply and demand in the taxi transport market, and establish a dynamic price adjustment mechanism linked with CPI, social average wage and oil price. To rectify illegal passenger vehicles and create a standardized, fair and orderly market ring.

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5. Summary

To achieve sustainable urban expansion, stronger metropolitan development management measures should be enforced to control local development on the city fringe and promote sustainable transportation.[5]

Numerous experiences have proved that urban traffic cannot be solved by relying solely on traffic construction without advanced and scientific traffic management. On the other hand, some traffic management measures, such as non-diversion, one-way traffic and rational layout of public transport stations, cannot be implemented without the cooperation of traffic construction. In order to build a modern transportation system, we should also build a modern transportation management system, which cannot be carried out in isolation and must be combined with traffic planning. Shanghai needs to establish an effective, unified and coordinated system of planning, construction, operation and management.

Traffic planning in Shanghai has been relatively perfect. Traffic occupies an important position in residents'lives. Residents' requirements for travel are also relatively high. This paper gives effective suggestions on the traffic congestion problems facing Shanghai at present.

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