

# *Evaluation of public transportation system in Shanghai, China*

Yali Yang<sup>1</sup>

1: College of Automotive  
Engineering  
Shanghai University of Engineering  
Science  
Shanghai, China  
Carolyn71@163.com

Hao Chen<sup>1</sup>

1: College of Automotive  
Engineering  
Shanghai University of Engineering  
Science  
Shanghai, China

Lihua Chen<sup>1</sup>

1: College of Automotive  
Engineering  
Shanghai University of Engineering  
Science  
Shanghai, China

**Abstract**—Public transportation is a relatively high-capacity and energy-efficient alternative for urban passenger transportation. With the development of society and economy, demand for public transportation increased dramatically in Shanghai. This paper probed into the public transportation system in Shanghai, evaluated its development. Based on current situation and trend in public transportation, the strategy for public transportation development pointed out. Further efforts should be allocated on infrastructure construction, public transportation priority system development, government finance and policy support, and establishment of information system, thus to establish a diversified, multi-level public transportation system in Shanghai.

**Keywords**- Public transportation, evaluation, Shanghai

## I. INTRODUCTION

Public transportation is a relatively high-capacity and energy-efficient alternative for urban passenger transportation, as compared with the private automobile. If planned, operated, and managed effectively, it can serve as an environmental safeguard for conserving energy, protection community quality of life, and facilitating urban economic growth and development<sup>[1]</sup>.

In order for any public mass transit service to secure the appropriate number of users, it is requisite that the users of the transit service can get to their destination faster and more comfortably. Public transportation facilities such as railways, etc. which have dedicated tracks can easily satisfy this requirement. However, with respect to route buses which travel on ordinary roads (excluding single-purpose roads) together with other motor vehicles, the facts about them are such that they are forced to stop and start repeatedly by traffic congestion and under the restriction of traveling by traffic signals, resulting in worsening the ride-in comfortability of passengers and a large delay in traveling. Public transport faces severe problems in almost all countries of the developing world, although the situation varies from one country to another, and even from one city to another<sup>[2]</sup>.

Along with the rapid development in economy, the need for transportation increased dramatically in China. The lack of transportation facility and low level of management

deteriorates the problem in public transportation. As one of the biggest cities in China, Shanghai has put a lot of effort on public transportation to solve the serious traffic congestion, with a population of 18.88million<sup>[3]</sup>. However, construction of main-road network, transit and subway systems has not solved the traffic problem, which is getting more and more serious.

Previous conducted survey showed that public transportation is the main form for people's daily trip. This paper attempts to evaluate the public transportation services in Shanghai, therefore find out solution for traffic congestion based on public transportation.

## II. CURRENT SITUATION OF PUBLIC TRANSPORTATION IN SHANGHAI

A comprehensive integrated public transport strategy is thought to be essential and absolutely required, consisting of rail-based main corridors together with road-based feeder systems. Moreover, a comprehensive traffic management schemes is also required to be implemented together with the integrated public transport strategy. A present public transport in Shanghai is provided by conventional bus services, taxis and rail transit.

Up to 2009, there are 927 public bus lines with 16944 buses. The transportation mileage for bus was 1.132 billion km, which transport 2.65 billion trips totally. Rail transit is another major public transportation form in Shanghai, especially between urban and suburb areas, which includes 10 lines, 228 stations and 346 km distance. Taxi is another way, with the population of 48614 in Shanghai<sup>[3]</sup>.

Survey showed that, public transportation is the main form for people's daily trip. Daily passenger population of public transportation is around 12.25 million in Shanghai, in which conventional bus accounts to 7.48 million (61%), rail transit accounts to 1.8 million (15%), and taxi accounts to 2.96 million (24%), shown in Figure.1. Up to 2006, the proportion of public transportation in people's daily trip in Shanghai is about 25.5%. It is estimated that, the proportion will rise to 33%, which means one third of trips will be in public transportation<sup>[4]</sup>.

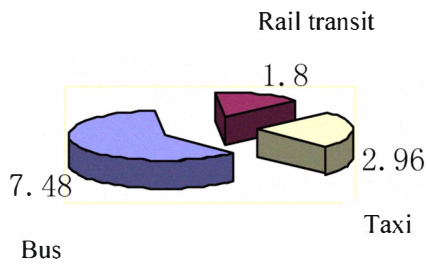


Figure.1 Three major public transport in Shanghai  
(Units: million)

Although great achievements have been made in public transportation in Shanghai, it is still behind the demand. There are several major problems, as follow.

*A. Insufficient public transportation facility*

Structure, distribution and management of public transportation do not match to the rapidly increased demand. With the rapid development in economy and society, the need for public transportation facility increases rapidly. But development of public transportation facilities falls behind, such as poor connection between bus and rail transit, lack of park and cargo facilities, especially in intensive developed central areas.

*B. Non-rational distribution of public transportation resource*

In the central area, density of bus lane is extremely high, with much overlapping. But in the suburb, bus lane is much less. The distribution of lanes and station is not compatible to the city function.

*C. Poor implementation of public transportation priority system*

Public Transportation Priority System is one of the effective solutions to traffic congestion in Shanghai. However, the implementation is not yet thoroughly. Improvement should be made in land use, government investment and road resources distribution. More efforts should also be put on management and coordination.

*D. Low level in information system*

Generally, the level of information system for public transportation is still low in Shanghai. Facilities and information are now under low level of sharing, which retards the development of public transportation [5].

III. TREND OF PUBLIC TRANSPORTATION IN SHANGHAI

Throughout these years, need for public transportation is increasing rapidly. Along with the development of metropolitan core area, a multi-level passenger transport system is required, due to the intensive development of core area. Thus, rail transit should be further enhanced in core area.

According to the Eleventh Five-year Plan for Transportation, rail transportation network will be established in 2010, with mileage up to 420km and 280 stations. Its transportation capacity will rise to 5 million trips per day. 30% daily trips will be taken in rail transit, which will become the main bone of public transportation in Shanghai. Public transportation will shift from traditional bus to rail transit.

Future public transportation system should meet the requirement in trip distance and travel demand. Therefore, a diversified, multi-level public transportation system will be established in Shanghai, which will rely mainly on rail transit, and be supported by traditional bus lane and taxi.

By integrating all forms, public transportation capability will be further strengthened. It is estimated that, public transport services to a radius of 500 meters from the site-wide coverage will cover all the urban and suburb areas. And a 45 minutes trip cycle will be established in urban areas. A modern and convenient public transportation system will be established in 2020, in which rail transit is the main bone, integrating bus, taxi and transfer station, to form a fast, safe and highly efficient public transportation system [3].

IV. STRATEGY FOR PUBLIC TRANSPORTATION DEVELOPMENT IN SHANGHAI

*A. Developing public transportation priority system*

Due to large population and less land resource, public transportation plays the main role in Shanghai's transportation. Public transportation has been initiated as the first priority. From 2007 to 2009, more than 110 billion Yuan has been invested on public transportation facility construction, with emphasis on rail track construction, bus lane adjusting, and transfer station construction for better connection between rail transit and other types of transportation [3].

*B. Improving infrastructure to establish public transportation network system*

Further development should be made in transportation infrastructure. Development of road system, rail system, highway infrastructure is the foundation for public transportation priority system. Resource, manpower and money should be allocated to infrastructure construction and management, to establish public transportation system. Land use for these facilities should be put on the first place, and public transportation priority on road use should be strengthened. Bus lane plan should be well executed based on road improvement and rail construction.

*C. Strengthening government support*

Public transportation is one of the important public services done by the government. More government support should be allocated to public transportation, especially financial and policy support. Public transportation expenditure should be taken into government financial system. More than 110 billion Yuan should be put on infrastructure construction by government. Relevant policies should be established to form a long-term development mechanism for public transportation, characterizing in integration of subsidy, compensation and

government purchase, thus to improve public transportation priority system<sup>[6]</sup>.

#### D. Establishing information system

Public transportation information system should be carried on. According to government plan, digital frame of public transportation system should be basically established in Shanghai in 2010. Public transportation information network will be established in 2011, which includes transportation information of all the stations and lines. The development of public transportation information collection and publishing system can give latest public transportation data, which will make daily trips more convenient and immediate. The establishment of information system will improve the efficiency of public transportation system, save energy and resource, thus to further strengthen its development.

### V. CONCLUSION

Along with the development in society and economy in Shanghai, development of public transportation will be further enhanced. Further efforts should be allocated on infrastructure construction, public transportation priority system development, government finance and policy support, and establishment of information system, thus to establish a diversified, multi-level public transportation system in Shanghai.

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