

# The Enlightenment of Singapore Public Transport to China

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**Abstract**—This paper analyzes the advantages of Singapore's conventional public transport from Singapore's urban profile, bus status and bus optimization measures, and compares the status quo of China's public transport with some inspirations about bus optimization.

**Keywords**—Singapore; regular bus; line optimization

## I. INTRODUCTION

As an important part of public transportation, conventional public transportation plays a very important role in undertaking public transportation in cities. The efficient use of conventional public transportation has a significant effect on reducing urban traffic pressure, reducing travel costs and improving road service levels. Singapore's regular public transportation is very advanced. This article is a detailed analysis of the advanced aspects of Singapore's conventional public transportation and provides ideas for the optimization of public transportation in China.

## II. CITY OVERVIEW

The Republic of Singapore, also known as the Lion City, is an island country in Southeast Asia, and the political system implements a parliamentary republic. Singapore's northern Johor Strait is adjacent to Malaysia, south across the Singapore Strait from Indonesia, and adjacent to the southern mouth of the Straits of Malacca. In addition to Singapore Island (88.5% of the country's total area), the country also includes 63 small islands.

Singapore has an area of 719.1 square kilometers, with a population of 5.612 million in 2017 and a population density of 7915.7 people per square kilometer. Singapore is a relatively developed capitalist country and is known as one of the "Asian Four Little Dragons". Its economic model is called "State capitalism". Singapore's urban spatial form is the spatial form of the central city + satellite city.

## III. SINGAPORE'S PUBLIC TRANSPORT STATUS

### A. Bus System

As of March 2012, there were 344 bus lines in Singapore, 4,112 vehicles in operation, and 3.4 million passengers per day. The proportion of bus travel accounts for about 50% of the proportion of public transportation.

Singapore's urban transport is dominated by public transport. In 2013, public transport assumed 63% of the

morning peak traffic, and this number is still rising in recent years. From 1970 to 1980, the Singapore government repeatedly studied and demonstrated over the past decade and established the development direction of an integrated public transportation system that combines rail transit and buses.

At present, Singapore's public transportation system consists of three parts: subway, light rail and bus. The subway is the main one, and the other two parts are supplemented. The bus system mainly undertakes the transportation of the interior and adjacent areas of the relatively close distance, so that the public transportation extends to all corners of the city. Public transport in Singapore restricts the entry of private bus companies into the market. All of its operations are carried out by two listed companies, Singapore Metro Corporation (SMRT) and Singapore MRT Corporation (SBS), of which SMRT is mainly responsible for rail transit and SBS is for regular buses mainly.

By 2030, 80% of residents will live within 10 minutes of walking distance from the subway station; 85% of bus journeys less than 20km will be completed within 60 minutes; public transportation will bear 75% of the total morning and evening peak traffic in Singapore.

### B. Bus Data

The number of private cars and other motor vehicles in the chart below continues to increase with the year, but the traffic volume entering the ERP control area during the morning rush hour remains roughly the same, showing the attractiveness of Singapore's public transportation.

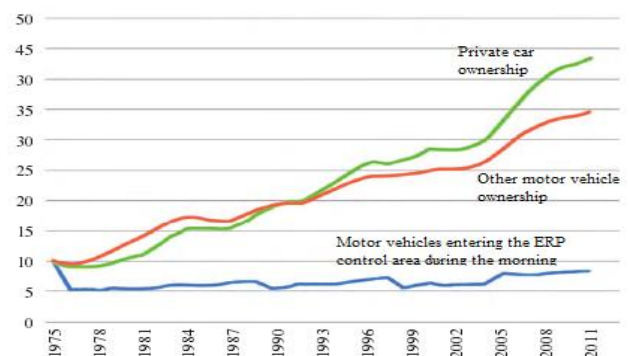


Fig. 1. Comparison of traffic volume in ERP control area and growth of private cars and other motor vehicles.

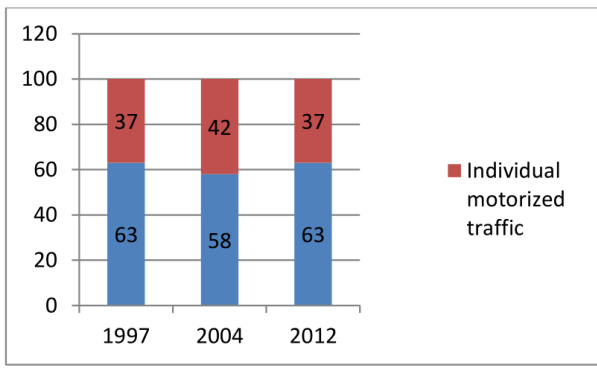


Fig. 2. Motorized travel mode structure change.

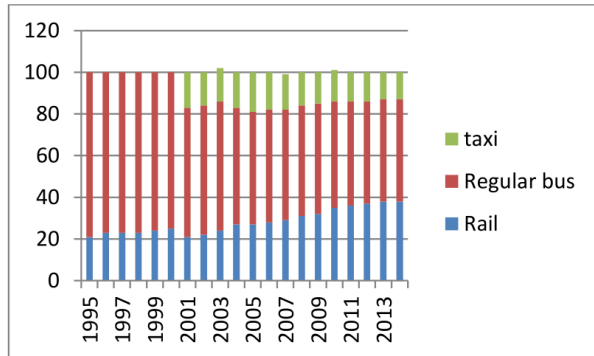


Fig. 3. Trends in public transport travel structure.

In order to increase the speed of bus travel, Singapore divides bus lines into basic bus routes and non-basic bus routes. The basic bus routes are the main body of regular bus routes in Singapore, and buses have the highest road driving right on this route. By 2016, Singapore has set up a 50km bus lane and a 23km all-weather bus lane to increase the average bus speed to 20-26km.

TABLE I. SINGAPORE BUS DATA

Project	Data
Average time of public transportation per day	84min
Daily commute time exceeds 2 hours percentage	25%
Average daily waiting time on weekdays	12min
Average daily waiting time is more than 20 minutes	11%
Single trip transfer percentage	69%
Single trip walking distance	0.56km

#### IV. CONVENTIONAL BUS INFRASTRUCTURE

Singapore buses need to be on the bus, and you need to press the button when you get off. If no one beckons or presses the button, the driver will not stop at the bus stop. Singapore's buses are equipped with a get-off button on each pole to ensure that everyone can press it. There are many double-decker buses in Singapore, and double-decker buses have the remaining seats on the upper level of the stairs.

There is a bus stop in Singapore. In addition to the larger size of the station, it provides more seats and carries functions far beyond the bus station. Singapore's bus station

is generally covered by the erratic weather in Singapore, and the bus station is also covered with vegetation on the roof. In addition to the basic services such as free WIFI, interactive electronic bulletin board and mobile charging station, this bus station also integrates functions such as libraries and galleries.

Since July 2010, Singapore's public transportation charges have used a distance-based system. The different modes of transportation and the operators are seamlessly connected. The passengers are required to pay the starting price for each transfer within the specified time range. The fare paid is calculated based on the distance of the entire trip.

#### V. BUS OPTIMIZATION

##### A. Smooth Ride Plan

The "Smooth ride plan" is to build a pedestrian-connected corridor to strengthen the connection between the traffic station and surrounding houses or other buildings. It will build more within the radius of 400m of the existing traffic station (currently the corridor covers a radius of 200m). Walk the corridor. By September 2018, the number of pedestrian corridors across the island has increased from the original 46km to 200km, and there are signs, subway maps and rests along the way, allowing passengers to walk to the station in a comfortable environment. This will greatly improve the passenger experience of transit stations and enhance the connectivity and attractiveness of public transport facilities.

##### B. Reform of Bus Contract Business Model

Singapore's ground bus service was originally operated by two private companies, the New MRT Corporation and the SMRT Bus Company.

Since September 2016, Singapore has implemented a bus contracting business model in which all ground transportation infrastructure and vehicles are received by the government. The ticket revenue is owned by the government. The operators are responsible for operating the winning routes and receiving service fees from the government. , also must comply with stricter service standards.

After the implementation of the bus outsourcing business model, it has introduced more competition from operators and strengthened government supervision. Passengers enjoy better services. All bus services are booked at intervals of up to 15 minutes in the morning and evening peak hours, half or more of which are the interval is less than 10 minutes. The feeder line is every 6-8 minutes. About 60% of bus services are less crowded, and the average waiting time for more than 100 routes is reduced by about 15%.

##### C. Bus Service Reliability Framework and Improvement Bus Service Plan

The Bus Service Reliability Framework has been piloted since February 2015. It will assess and evaluate the additional waiting time indicators for more frequent lines, and then award a reward of S\$2,000-6000/month or a penalty of S\$1300-4 000/month. The Bus Service Reliability Framework sets out the criteria for additional waiting time

and on-time passengers. The vehicle terminal prompts the driver to speed up or slow down the vehicle, and the interval with the preceding vehicle is kept within an acceptable interval of 0.1 minute; if the rear section of the line is often elongated due to road conditions, the operating company needs to arrange the standby vehicle nearby. Insert line operations.

Then, the On-Time Adherence assessment of the large interval lines improves the reliability of the bus service. In September 2012, Singapore launched an improved bus service plan worth 1.1 billion Yuan. The purpose is to significantly improve bus services in a short period of time before the new subway line has been built.

After five years, the plan has been completed, including new In addition to the purchase of vehicles, 1,000 new buses have been put into service, and the frequency of the buses has been more frequent. The bus companies also use double-decker buses with higher passenger capacity. There are 218 routes (about 70%) of passenger capacity or service. Improved; encrypted hours during peak hours, from at least 90% of the peak line service five years ago, the service interval is less than 10 minutes, and the interval between all feeder line services should not exceed 8 minutes. Singapore has improved its existing route services, reducing the number of routes with a full load rate of more than 85% from 96 to 4. The new 80 routes have been opened, and the basic route has increased from 261 to 309 five years ago.

#### *D. Necessary to Make Way for the Bus*

In order to improve the speed and reliability of the bus, the Land Transport Bureau has launched a series of initiatives (or proposals), which have been promoted for a long time is the "Mandatory Give-Way to Buses Scheme". This measure guarantees that within a certain range around the bus station, the bus will be used preferentially in the morning and evening traffic hours, and the vehicles will be connected and departed smoothly. The cars that affect the bus entry and exit will be recorded by the cameras installed on the bus and will be recorded. Punishment as a mandatory way of giving control was piloted at the end of 2008.

The results of the pilot at 22 stations showed that the measure increased the speed of the bus leaving the station by 73%. By December 2010, 202 bus stops across the island had implemented the plan, and in 2014, another 150 sites were added. "Must have to give way to the bus" is just one of the initiatives to strengthen the bus. The Land Transport Bureau also ensures that buses travel on the road as uninterrupted as possible by constructing 150 km of bus lanes, intersections, bus lights, counter-bus lanes, and isolated bus roads, and provides more priority to road rights.

#### *E. Flexible Itinerary*

The flexible itinerary plan is a comprehensive long-term action plan that guides enterprises to participate through policy support, allowing office workers to have a certain degree of flexibility in commuting time. The purpose is to encourage peak travel, promote more reasonable travel modes, and reduce traffic pressure during peak hours. In the pilot phase of 2014, the government mainly cooperated with

companies and institutions with more than 200 employees in the office-intensive areas around important subway stations. The government departments also participated in the flexible commute time period – the working hours were 7-9 am. The working hours are from 3 to 5 pm, and the total working time remains unchanged. From the actual situation of the government departments to implement flexible commuting time, after reasonable arrangements for some details, this plan does not affect the operational efficiency of the organization.

## VI. CONCLUSION

Singapore's public transport is mainly operated by two listed companies, and the bus companies are responsible for their own profits and losses. The two bus companies have different priorities in their operations and avoid vicious competition in the market.

Singapore's high bus travel rates are partly due to Singapore's ultra-high car purchase tax, which states that people who buy cars must participate in public auctions to obtain a Car Ownership Certificate (COE), which is currently a small displacement. The car's car certification is around S\$40,000 and is valid for only 10 years. And the price of a petrol car includes a fuel tax, and the diesel car pays a diesel tax. Under such a policy, more people will choose to travel more conveniently.

Singapore's bus optimization is more reflected in the policy, they try to use more convenient public transportation and lower travel costs to attract more people to stagger the use of public transportation in the morning and evening peak hours.

## REFERENCES

- [1] Sha Yongjie, Ji Yan, Chan Wan Ting Pristine. Singapore Public Transport Planning and Management [J/OL]. International Urban Planning. 2019-08-01.
- [2] Xu Mingxun. Study on Urban Land Public Transport Management Regulations under the Background of "Internet +" — Taking Beijing as an Example [J]. Journal of China University of Political Science and Law, 2018(04):37-46+206-207.
- [3] Wang Jianmei. Research on the efficiency of getting on and off the city bus [D]. Chang'an University, 2015.