

Research on Subsidy Mechanism of Urban Ground Bus in Beijing

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Abstract—Urban ground transportation is an important part of public transportation and plays an important role in promoting urban economic development and relieving urban traffic pressure. Due to the implementation of the relevant preferential policies promulgated by the government, a large number of policy losses have occurred in the implementation process of Beijing public transport enterprises. Therefore, the government needs to provide a large amount of subsidies every year, but there are many problems in the current bus subsidy mechanism, which not only makes the subsidy inefficient but also does not play an incentive role. On the basis of studying the present situation and problems of the existing subsidy mechanism in Beijing, this paper puts forward specific measures, including diversifying the sources and ways of subsidy funds, refining the calculation of subsidy amount and perfecting the incentive mechanism and the construction of relevant laws and regulations.

Keywords—public transit; urban ground bus; subsidy mechanism

I. INTRODUCTION

Beijing is the capital of China, and its population growth and economic development are very fast. In recent years, as people's income has increased, their living standards have also risen, and more and more families have private cars. Traffic congestion in Beijing is becoming more and more serious, and public transportation has received attention. The development of public transportation in Beijing has always been at the forefront of major cities in China, and the government's subsidies for bus companies are also the largest. However, there is no scientific and reasonable definition of policy losses and operating losses, and there is a problem of information asymmetry between bus companies and governments. These problems have led to the low efficiency of Beijing bus subsidies and the existing subsidy mechanism has not played an incentive role for bus companies to improve service levels and operating profits. By analyzing the current situation of Beijing's bus subsidy mechanism, this paper finds out the existing problems and puts forward some improvement measures.

II. RESEARCH STATUS OF PUBLIC TRANSPORT SUBSIDY MECHANISM AT HOME AND ABROAD

Foreign scholars' research on public transport subsidies started early, Schneider(1965) concluded that if public transport wants to change from slow, untidy and uncomfortable to more modern mode of transport, the government needs to provide key support for public transport, especially economic security[1]. Stephen Glaister, Davis Lewis(1978) pointed out that the key factor for public transport subsidies was that low fares can promote the transfer of private car users to public transport users. DH Pickrell, JA Gomezibanez also used the relevant principles of economics and cost-benefit analysis method to analyze and determine the optimal subsidy level by simulating the impact of changes in ticket prices and service quality on enterprise costs and benefits[2]. Peter Nelson and Andrew Baglino et al. (2007) used the theory of utility and combined with the regional transport model to establish a relevant model for estimating the benefits of the public transport system for public transport users and the benefits of reducing congestion caused by the use of public transport for private car users. Finally, the subsidy is worthwhile, and the benefits of the subsidy are much higher than the subsidy itself [3].David A. Hensher , Chinh Ho(2016) suggested introducing incentive mechanism into bus subsidy, and proposed an incentive mechanism model based on the operating mileage of bus enterprises[4].

It was only in the 1990s that China began to study this field. Zehai Yang(2000) divided the loss situation of public transport into two parts: operational and policy-oriented. Combining with the advanced experience of foreign countries, they put forward constructive reform plans for the two modes of authorized operation in the subsidy mode of policy-oriented loss[5]. Guoli Ou , Min Zhang(2001) argued that in order to measure the effectiveness of subsidy system for urban surface public transport enterprises, it is necessary to analyze whether this scheme can make public transport enterprises improve their production efficiency without reducing subsidy[6]. Xuexin Liu,Yu Lu(2014) analyzed the advantages and disadvantages of explicit subsidy, invisible subsidy, total subsidy and factor of production subsidy in combination with the subsidy model of urban surface bus in foreign countries. And they put forward a financial subsidy method based on comprehensive performance evaluation by linking the evaluation results with subsidies[7].

III. CURRENT SITUATION AND PROBLEMS OF BUS SUBSIDY MECHANISM IN BEIJING

A. Current Situation of Bus Traffic Volume in Beijing

Beijing is the first city to give priority to public transport in China. The development of urban ground public transport has been in the forefront of the country, and the Beijing government has provided a large number of subsidies to public transport enterprises.

Since 2014, the growth rate of bus operation vehicles has changed from positive to negative. The reason is that Beijing ground bus has implemented a new fare scheme. The fare has risen compared with before, and the passenger volume has also declined, which ultimately leads to the reduction of operating vehicles. Specific data changes are listed in Table I.

In recent years, the length of bus lines has been decreasing. The main reason for this change is that the optimization and transformation of bus lines have increased the utilization rate of resources, thus reducing the repetition rate of bus lines and the length of lines. Specific data changes are listed in Table II.

B. Development of Beijing Bus Subsidy System

The development of Beijing's bus subsidy mechanism can be roughly divided into five stages. The first stage is from the founding of the People's Republic of China to 1998. During this stage, Beijing vigorously developed public transport and implemented the monthly ticket system, which resulted in a large number of operating losses of public transport companies. The government subsidized them in response to this situation. The second stage is from 1999 to 2002. The subsidy scope of this stage is relatively small. It is limited to the route where monthly tickets can be used and combined with the real subsidy. The third stage is from 2003 to 2006. In addition to subsidizing Beijing Bus Company, the government also subsidized Beijing Bafangda and other companies. The fourth stage is from 2007 to 2009. In order to meet the Olympic Games, the government subsidized the public transport enterprises from both policy and financial aspects, and began to implement the public transport IC card, which replaced the monthly ticket system with a discount. The last stage is from 2010 to the present. The calculation of subsidy base in this stage is based on the actual revenue and expenditure accounting method. It is subsidized according to bus vehicles, running kilometers, fuel prices and other factors.

TABLE I. THE NUMBER AND GROWTH RATE OF BUS OPERATING VEHICLES IN BEIJING FROM 2013 TO 2017

Year	2013	2014	2015	2016	2017
Number	23592	23667	23287	22688	25624
Growth Rate(%)	6.53%	0.32%	-1.61%	-2.57%	12.94%

Data from the National Bureau of Statistics of China

TABLE II. BEIJING BUS OPERATION LINE LENGTH AND GROWTH RATE FROM 2013 TO 2017

Year	2013	2014	2015	2016	2017
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Length of Line (km)	19688	20249	20186	19818	19290
Growth Rate(%)	0.72%	2.85%	-	-	-
			0.31%	1.82%	2.67%

Data from the National Bureau of Statistics of China

C. Problems in Beijing Public Transport Subsidy System

The Beijing Municipal Government has always attached great importance to the development of public transport. The subsidy amount in this respect is very large, which alleviates traffic congestion to a certain extent, but there are still many problems in the subsidy system.

1) *Ambiguous of the object of subsidy*: The loss of public transport enterprises is largely due to policy losses, but the Beijing Municipal Government has not distinguished the public welfare and operational nature of the policy losses, which has led to low subsidy efficiency. Therefore, the more government subsidies, the more waste, and it has played a restrictive role in the integration and optimization of urban public transport resources.

2) *Single subsidy method*: At present, Beijing's public transport mainly adopts the way of direct subsidy, and the government has not formulated a detailed subsidy plan. In fact, subsidies should be selectively carried out according to the operating mode and profitability level of enterprises. The flexibility of subsidies can not only alleviate financial pressure, but also improve the efficiency of subsidies.

3) *Single source of subsidy funds*: Beijing's subsidy fund mainly depends on the government's finance, without the support of transportation funds, which not only brings great financial pressure to the government, but also unfair to taxpayer who do not enjoy public transport.

4) *Lack of scientific and accurate assessment indicators*: The amount of subsidy relates to the calculation of kilometres per vehicle and reasonable cost. There are many factors involved in cost and it is difficult to calculate it separately. When the government allocates subsidies, it also fails to assess the enterprises, which leads to some public transport enterprises relying too much on subsidies and lacking competition consciousness. Therefore, it has not played a role in promoting public transport enterprises to improve service quality.

IV. MEASURES TO IMPROVE BEIJING'S BUS SUBSIDY SYSTEM

In the above analysis, the main problems existing in Beijing's current bus subsidy mechanism are summarized. The following are some measures to solve these problems.

A. Diversification of Subsidies

At present, Beijing Municipal Government vigorously promotes the public transport priority policy, but if the government wants to improve the existing problems, it should also consider policy support and technological renewal. At the

policy level, the government can implement tax exemption or preferential policies for public transport enterprises to reduce their operating costs. At the technical level, the government can also support the information construction of bus stops by using big data and information technology to eliminate the information asymmetry between passengers and buses. This can improve citizens' willingness to take public transport to a certain extent. The government can also encourage and help public transport enterprises to operate other businesses, which can effectively compensate for part of the loss of public transport enterprises and reduce the pressure of government subsidies.

B. Diversification of Subsidy Funds Sources

If the public transport industry wants to achieve sustainable development, it must broaden its sources of funds. The government should incorporate the construction of public transport into the public finance system of the government, and gradually realize the transformation from government subsidy to government purchase, so as to realize the optimal allocation of market resources in the public transport industry.

C. Refine Subsidy Amount Accounting

The government should distinguish operating losses from policy losses as much as possible and formulate a rigorous calculation method. On this basis, a price system and a social supervision system determined jointly by the government and the market will be established, and various subsidies and calculation methods will be published to reduce information asymmetry.

D. Improving the Incentive Mechanism of Subsidies

At present, public transport enterprises have a strong dependence on the government. In order to improve this, the government should establish a set of public transport service evaluation system. The system links the amount of financial subsidy to the satisfaction of passengers with the city ground bus. When passengers are satisfied with the service provided by the bus enterprise, the government can give them a certain reward. On the contrary, if the bus enterprise can not satisfy the passengers, the subsidy amount will be reduced. In this way, public transport enterprises can be promoted to improve their service level and quality.

E. Perfecting Relevant Laws and Regulations

Law is the guarantee for the development of urban surface public transport, but at present, there are relatively few formal regulations for the management of public transport subsidy in China. Therefore, local laws and government regulations should be formulated according to local conditions so as to make the implementation of relevant policies legitimate.

V. CONCLUSION

Taking Beijing as an example, this paper studies the status quo of urban ground bus and the problems in subsidy. Beijing is the first city in China to put forward and implement "public transport priority". The Beijing Municipal Government also provides a large number of subsidies to public transport

enterprises. The development of subsidy mechanism can be divided into five stages. Although it has been reformed, there are still many problems in Beijing's public transport subsidy system, such as vague object of subsidy, single mode of subsidy, single source of subsidy funds and lack of scientific and accurate assessment indicators. In view of the existing problems in Beijing, this paper puts forward some corresponding suggestions.

The government should consider policy support and technological renewal to diversify subsidies. It should broaden the sources of subsidy funds so that the subsidy is no longer funded by financial funds, thereby reducing the burden on the government. The calculation of subsidy amount needs to be refined so as to distinguish policy losses and operational losses as far as possible in order to ensure the efficiency of subsidy funds. In order to promote the sustainable development of the public transport industry, the government should also improve the subsidy incentive mechanism, improve the relevant laws and regulations, and provide adequate protection for the development of urban ground public transport.

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