Analysis and optimization of influencing factors of urban rail transit capacity

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Abstract: The rapid development of the national economy has accelerated the pace of urbanization, and the contradiction between the development of cities and the pressure brought by traffic is increasingly complex. How to solve the high density of population circulation has become a huge problem. Since the birth of London Metropolitan subway in 1863, the subway plays an increasingly important role in urban transportation. Nowadays, subway is in a period of continuous expansion of scale, continuous improvement of system and continuous improvement of service quality. Of course, there are some problems in the operation of subway in many cities. As a very important means of transportation, the influencing factors of its transport capacity are worth exploring and studying. With the development of China's economy, the process of urbanization is speeding up, and the number of urban population continues to increase. At the same time, the traffic pressure in urban areas has increased significantly. Traffic congestion has become the normal of urban economic development. Ecological environment pollution and resource shortage are increasingly prominent. In order to solve these problems and promote the sustainable and healthy development of urban economy, urban rail transit projects have been started in various regions, among which subway is a typical representative. In the actual operation process, the transport capacity of the subway will be affected by many factors. Therefore, the relevant departments should strengthen the analysis and research, formulate reasonable strategies, and promote the comprehensive improvement of the subway transportation capacity, so as to play its due role in the urban transportation system.

1. Introduction

In recent years, China's railway construction technology has reached the world's leading level and made brilliant achievements. With the development of the city, people's life rhythm is faster and faster, the traditional transportation has been unable to meet the current needs. As an important means of transportation, subway can effectively solve the problems of traffic congestion. At present, the scale of subway construction in China is becoming larger and larger, but there are still many problems in transportation capacity. How to find out the factors restricting the transportation capacity of metro rail transit and solve them is the key to promote the construction of subway and improve the efficiency of transportation[1]. Under the background of the new era, the pace of life in the city continues to accelerate. As the most common and basic mode of transportation in people's daily life, subway is the most indispensable part and an important part of urban transportation. The rapid development of economy has been fully reflected in the process of urbanization, a large number of people into the city, which greatly affects the efficiency of urban transportation. In the case that the transport capacity of public transport and other transport modes has been difficult to improve, it is particularly important to find out the influencing factors of the transport capacity of metro rail transit and formulate relevant solutions[2]. This paper will briefly describe the influencing factors of urban rail transit capacity, and explore the improvement strategy.

2. Influencing factors of transportation capacity of Metro Rail Transit

2.1 Transfer station and transfer location

At present, some cities set the subway network as a star structure, and only one transfer point is designed for the routes in the network system. The transfer point can realize the transfer of all metro lines. At the same time, this mode also leads to a large number of passengers gathered in the same transfer point, causing the problem of excessive passenger flow at the transfer point. There are

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some difficulties in the design and construction of transfer points. Some subway transfer stations adopt the layered transfer mode, which has extremely strict requirements for the overall embedding of the station. The passenger transfer time is long and the transfer route is far away. The cost of ventilation and drainage facilities in the subway station is significantly increased, and the transportation capacity of the subway is adversely affected. In some cities, the mode of tree structure is adopted in subway transportation network[3]. The connectivity of subway lines is relatively poor. Many subway lines often need to transfer for many times to realize interchange. This design method will lead to unbalanced passenger flow distribution, overcrowding of transfer stations, and great difficulties in metro traffic organization and arrangement.

2.2 Lack of suburban lines and radial diagonal lines

The subway lines with grid network structure form a parallelogram like cross mode. Passengers have more choices for transfer, and the transportation capacity of the subway has been improved to a certain extent[4]. However, this design mode will lead to the lack of radial diagonal lines of suburban lines, suburban residents can not use the subway to reach the downtown area, and the transportation efficiency is low.

2.3 Stop operation time

Unreasonable stop time is an important factor in the application of subway transportation capacity. The operation time of subway station is related to operation, passenger order, operation process, time design and other factors. During the peak period of subway operation, the problem of long stop time will appear. A large number of passengers rush into the subway car, which leads to the failure of the screen door to close normally. The operation efficiency and transportation capacity of the subway are significantly reduced, which seriously affects the actual role of the subway. Subway is a symbol of urban transportation modernization, and a window of urban culture and economy. Imagine that if people go to a city, when they choose transportation, the service attitude and service level of the Steward will affect the passenger's riding experience, and even fail to meet the basic needs of passengers for the subway[5]. Then, in the process of passing ten to one hundred, social effects will inevitably affect the quality of subway transportation. From the current situation of domestic subway service, there are many crew members whose personal quality and business level can not meet the basic requirements. Even the service attitude of some crew members can be described as bad. If the management of getting on and off the train is not in place and the service level is low, it will affect the urban traffic development ability and is not conducive to people's normal travel.

3. Strategies for improving the transportation capacity of Metro

3.1 Strengthen the research of line design

Unreasonable design is the core factor affecting the transport capacity of metro rail transit. Therefore, in the process of metro line design, it is necessary to fully consider the passenger's riding demand and comfort, analyze the distance between the suburb and the city center, and improve the transportation quality. At the same time, in the design process, we need to fully consider the factors such as passenger flow, transfer location, transfer conditions and so on. We can design the subway transportation network as a radial ring structure, realize the convenient transfer and direct connection between the city center and the suburbs, between the suburbs and the suburbs, realize the high connectivity of the subway lines, promote the conversion ability of different urban traffic modes, and ensure the subway line The comprehensive coverage in urban areas will realize the comprehensive improvement of subway transportation capacity[6]. In addition, in the process of metro design, we should reasonably use the high-tech mode such as signal technology to realize the rapid determination of the actual location of metro vehicles, reduce the tracking time of the subway, shorten the driving interval, and improve the running speed of the subway, so as to realize the overall improvement of the subway transportation capacity.

3.2 Adjustment of Metro turn back mode and operation mode

Metro turn back mode is closely related to transportation capacity. In the process of subway construction, reasonable design of lines is needed to meet the basic requirements of subway turn back. The research shows that the turn back capacity behind the subway station is significantly higher than that in front of the station. Therefore, the two-year post-war turnaround mode should be adopted in the construction process, or the special subway turn back station and turn back crossover can be built to meet the basic demand of turn back. In order to improve the turn back capability of metro, some measures can be taken, such as reducing the stop time of subway, increasing the speed of crossing the turnout and shortening the system conversion time[7]. In order to solve the problem of uneven distribution of subway passenger flow, it is necessary to select reasonable routing operation mode. Small routing mode can be adopted in the area with relatively large passenger flow in the city center, while the mode of large routing is mainly used in the area with relatively small passenger flow in the suburb, so as to avoid the waste of transportation resources and realize the comprehensive improvement of transportation capacity.

3.3 Reasonable traffic arrangement to improve service quality

The uneven distribution of subway passenger flow will lead to the increase of traffic pressure and the decrease of transportation efficiency and transportation capacity. Therefore, the relevant departments need to reasonably arrange the train operation, fully consider the factors such as train configuration, passenger flow, turn back and passing, and reasonably arrange the train operation according to the actual operation demand. The subway is an important public service facility[8]. Therefore, the relevant staff should improve the service quality of the subway, improve the overall efficiency of passenger transfer and boarding and alighting, standardize the service behavior of subway staff through clear service standards, ensure the riding order, avoid safety accidents such as passengers rushing into the subway, and minimize the possible occurrence of subway All kinds of potential safety hazards, through the improvement of measures to achieve the gradual improvement of subway transportation capacity.

4. Conclusion

In recent years, China's rapid economic development has promoted the process of urbanization. However, with the development of the city, there is also a huge traffic pressure. The traditional transportation mode can not meet the needs of urban development. Many big cities are planning and constructing subway track to relieve the traffic pressure. However, in order to improve the efficiency of subway transportation, we should adopt a variety of factors to improve the efficiency of subway transportation Our travel requirements. The development of urbanization provides unlimited possibilities for China's economic construction. In order to solve the problem of traffic congestion, more and more cities adopt the way of building subway. In order to ensure that metro operation can relieve the urban traffic pressure and improve the urban transport capacity, it is necessary to analyze the restrictive factors that restrict and affect the development of Metro. Subway is an important part of urban traffic and an important part of urban traffic development. We must pay attention to the analysis of the restrictive factors of the subway transportation capacity, constantly adjust the subway transportation strategy, and provide a green and healthy subway operation system for the development and construction of the city.

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