

# Research on the Demand Forecast of Rail Transit and Intercity Railway Passenger Flow based on Improved Logit Model

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**Abstract:** This paper analyzes the connotation of urban integrated passenger transport hub from the perspective of traffic engineering, analyzes the characteristics of urban integrated passenger transport hub, divides the types of integrated passenger transport hubs, and analyzes the types of hubs used by different types of cities. The passenger demand, the willingness and the ability to purchase the passenger service needs as the premise, define the urban comprehensive passenger terminal passenger demand research scope, namely the hub external passenger demand, the hub demand and the hub parking demand three aspects. Based on the survey of passenger transport demand and passenger characteristics and the data collection, this paper analyzes the formation mechanism and selection rule of passenger preference, introduces the concept of passenger dependency on the characteristics of passenger service, quantifies the passenger willingness, The mapping of passenger service characteristics. The probability of distribution of different passenger services is subject to a number of logit probability distribution models as assumptions to solve the passenger willingness and dependency of different passenger services.

**Keywords:** Logit Model, Railway and Intercity Passenger, Demand Forecast

## 1. INTRODUCTION

In recent years, with the rapid growth of China's economy and the accelerated development of the city, the traffic system as a basic condition for serving people's production and living, the level of facilities and equipment has been significantly improved, the network size has been extended and extended, More and more enhanced. However, from the overall adaptability of the traffic system, not only the problems accumulated in the development have not been fundamentally resolved, but also the emergence of some new situations and problems. On the one hand, due to the weak foundation of China's traffic facilities construction, coupled with the growth rate of traffic demand is much greater than the construction of facilities, increasingly contradictory supply and demand, resulting in traffic congestion,

frequent accidents, exhaust pollution and other "bottleneck" Urban and economic development; on the other hand, in view of the traffic construction and management departments in the dilemma, the structural problems of transport is still more prominent, a variety of modes of transport division of labor, convergence complementary function is still to be improved, the city external and internal traffic Transfer service level is still a big gap with the developed countries. Therefore, the construction of a scientific and reasonable, integrity, high coupling of the integrated transport system is the current stage of China's traffic development, an important goal.

The modern passenger transport system is an organic combination of inter-regional railway, road, water and air transportation modes such as bus, BRT, track, car, walking and so on, and reasonable structure, reasonable line Class lines and the appropriate size of the transfer hub to form an integrated transport network to meet the modern passenger traffic smooth, convenient, safe and comfortable service needs. The planning and construction of the integrated transportation hub provides an opportunity for the system to solve the problem of urban traffic structure optimization. The implementation of the hub project provides a breakthrough for optimizing the way of connecting the city and outside traffic. This paper mainly analyzes the passenger demand of large-scale urban integrated transportation hub. The main purpose of the study is to provide the comprehensive transportation hub for high-speed railway and rail transit with the help of large-scale construction of high-speed railway and passenger dedicated line. This paper analyzes the development level and characteristics of external passenger transport, passenger transport and parking facilities related to the hubs in China at present and the objectivity. Second, aiming at the characteristics of passenger transport in the hub and exploring the origin of passenger demand in the hub, aiming at the current situation of urban integration This paper puts forward the forecasting method and model of passenger demand forecast of urban integrated transportation hub, and provides the basis for system analysis and scientific decision-making for the planning,

feasibility study, design, implementation and operation management of urban integrated transportation hub, And then guide the development of urban integrated transport hub to the scientific and modern.

## 2 ANALYSIS ON THE DEMAND STRUCTURE OF PASSENGER TRANSPORT IN INTEGRATED TRANSPORTATION HUB

The need in economics refers to the need for a capacity to pay, that is, the needs of consumers to prepare, willing and have the ability to buy. Then, passenger demand refers to the passengers are prepared, willing, and the ability to purchase passenger services needs. For passengers in the integrated transport hub, the passenger demand for the hub is the number of passengers who are willing to purchase such passenger services under the premise that the hub can provide passenger services. At this stage, China's integrated transport hub to provide passenger services can usually be divided into three parts, namely, external passenger services, passenger services and parking services. With AD on behalf of the hub of the passenger demand, that can be used to express.  $AD = (ID, TD, PD)$

Among them, ID represents the comprehensive transportation hub of the external passenger demand, in view of the study of the comprehensive transport hub is a large number of one or some of the main mode of external transport, then we can also call this external demand For the total demand; TD on behalf of the integrated transport hub of the transfer demand, refers to the passenger traffic to complete the urban traffic convergence that part of the demand; PD on behalf of the integrated transport hub parking needs, is able to external passenger or pick-up The provision of parking services that part of the demand. The three are mutually independent and interrelated, in which the size of the external passenger demand control the total amount of transfer needs, there are  $ID + TD + TD + TD$  public agency, when the hub is only one kind of external transport Take the equal sign, when the hub has two kinds of external transport mode, ID should also include two kinds of external transport mode between the transfer; transfer demand in the proportion of social vehicles determine the parking demand for the total passenger  $TD + PD$  agency, when riding a social vehicle that is stopped when the parking does not produce traffic, when there is no stop to take the social vehicles, the social vehicle passenger traffic is equal to the traffic generated by parking.

City integrated transport hub as a city of a large-scale passenger gathering, interchange, evacuation, and assume a variety of urban transport and urban traffic within the way the flow of traffic, diversion function. Therefore, the external passenger demand, for example, in addition to a derivative, extensive, complex, stage and other general features, but also

has the following characteristics: ① Agglomeration: integrated transport hub external passenger demand is people's social and economic activities A derivative demand, and socio-economic activities in essence with clustering characteristics. Such as the coastal area of passenger demand is greater than the mainland, the national political and economic center city passenger demand is greater than other cities, provincial capital city passenger demand is greater than the non-capital city, so that different regions of the transport hub passenger demand has obvious clustering The ② Unevenness: The passenger travel activity relies on various factor endowments. Due to the uneven distribution of factor endowments in time, the demand for aggregation of passengers' travel activities at different time nodes is very different. In general, the amount of passenger traffic in the summer and summer is higher than that in winter, and the amount of passenger traffic in the morning and evening is higher than that in other ordinary times. For the planning and design of the hub, the scale of the relevant facilities is usually determined by the maximum number of units per unit of time.

## 3 FORECASTING METHODS AND MODELS OF PASSENGER DEMAND

The main task of passenger demand situation is to extract the target elements and related elements of passenger demand situation, define the mathematical expression form of elements, determine the data source of elements, and use the output of element data of this stage as the input of passenger demand forecasting stage.

The demand for external passenger transport in the whole city can be abstractly expressed as a series of meaningful data changes in the spatial sequence or time series of the urban community. Under normal circumstances, passenger demand representation elements are mainly passenger and passenger turnover in two forms. The total amount of passenger traffic (Q) in the city is the number of passengers actually transported by all means of foreign passenger transport in a period of time. It is an important indicator of the quantity of transport production and service. (WQ) refers to the product of the number of passengers and the average distance in a certain period of time. The dimension is "human kilometers". These two kinds of target elements need to be based on certain statistical data. Taking the statistical data of Beijing's total social passenger traffic as an example, according to the time series statistics, the data of 2001-2011 basically show the increasing trend, but in view of the change of statistical caliber in 2006-2011, some data show that the data itself And the sudden change in the characteristics of the change, these data need to be amended to deal with, according to the interpolation method, the amendment of the city in 2006, the total amount of foreign passenger traffic in Beijing 71126,

93687.

An associative element is a set of elements that have some similarity in the reflection of the attribute. According to the principle of macroeconomic control of the total amount of social factors, the category of related elements can be divided into four levels: economy, industry, location, population and consumption. (1) economic class (E), economic activities will directly increase the flow of personnel in the region, resulting in passenger demand. The faster the city economy is located, the higher the demand for passenger transport. The following elements are selected: 1E, gross domestic product (GDP), is the world's most common indicator of a country or region's macroeconomic situation. Is the sum of the total market value of the final product and the final service provided during a certain period of time. 2E, GDP index, is reflected before and after the two comparable period of the same region of GDP comparison results. The GDP index is less than 100, and the GDP index is less than 100, which is similar to the expression of growth rate, which is the dynamic reflection of the degree of economic development in a certain period of time. 3E, per capita GDP, is a period of a region of GDP and resident population compared to the accounting. Countries in the world usually use per capita GDP to measure the average living standard of a region. 4E, per capita GDP index, similar to the GDP index, is reflected in the previous two comparable periods of the same region per capita GDP comparison results, is the period of time to improve the level of living a dynamic reflection. 5E, sustainable economic development elasticity coefficient, GDP can be used to measure the number of economic development in the region, sustainable economic development elasticity coefficient is to measure the quality of economic development, economic development, high quality development is not dependent on energy, resources, environmental factors into Economic growth, but to improve the quality of the elements and the use of efficiency, to adopt new technologies, new technology, increase investment in science and technology to achieve economic growth. The lower the energy consumption, the lower the resource occupancy rate, the better the environmental protection, the better the sustainable economic development. JH is defined as the elastic coefficient of sustainable economic development of a city, and the elastic coefficient is calculated by combining expert advice and analogical analysis of energy, resources and environment. The formula for calculating the elastic modulus of sustainable economic development is shown in Equation 4-1. Equation 4-2 and Equation 4-3 show the elasticity coefficient of resource consumption and the environmental protection. In this paper, the elasticity coefficient of sustainable economic development is defined as the assumption of energy, resources and

environment. Elastic coefficient calculation formula.  

$$1/3 \quad 1/3 \quad 1/3 \quad ERCE = * H + * H + * H$$

#### 4 HUB TRANSFER DEMAND FORECASTING METHOD AND MODEL

To solve the passenger in different ways, different lines on the transfer problem is the city integrated transport hub planning and design and management of one of the main purposes. It is the key to improve the service level of the hub and enhance the quality of the hub service. It is also an important way to adapt to the development of the comprehensive transportation system in China. Therefore, it is a key step in the planning and design of the urban integrated transportation hub, and the reliability of the prediction result is related to the natural resources and resources of the hub during the construction and operation of the hub. Human resources can be reasonable, moderate use of the guarantee.

The term "comprehensive" in the city's integrated transportation hub is aimed at the assembly of different modes of transportation or transportation. The purpose of the hub is to meet the needs of different modes of transportation or transport. At present, China's urban integrated transport hub in the convenient transfer, user-friendly design has outstanding performance, mostly aviation, high-speed railway and other fast, convenient way of transport as the main target passenger terminal, station or terminal. From the adaptation of China's economic and social development and traffic trends and trends, to one or several foreign modes of transport-led, and with the construction of this convergence of urban transport (urban internal transport) such a comprehensive Traffic hub in the composition of China's passenger station occupies an important position, the market share of the future will show a gradual upward trend. This kind of hub is chosen as the main research object of transfer demand.

The transfer mode corresponding to the above-mentioned integrated transportation hub is located here: ① the way between two or more modes of external traffic changes; ② the way of external traffic and the way of urban traffic changes between the way; ③ do not take into account the way the city within the way of traffic changes between the way, and the same way between different ways to change the line, The transfer demand of the urban integrated transportation hub is a kind of demand for the passenger demand of the hub. It can be said that the transfer demand is not only a manifestation of the passenger demand of the passenger transport hub, but also the passenger can pay the traffic A form of expression of transport demand. In the new period, the new social development situation, the city comprehensive transportation hub not only need to meet the requirements of transfer capacity, but also need to meet the passenger transfer fast, convenient, humane, comfortable, integrated service requirements,

which is The inevitable trend of the development of integrated transportation hub. Therefore, the analysis of the hub transfer needs includes not only the calculation of the demand for transfer, but also the analysis of the level of transfer demand realization. At this stage of a city mode of transport to a specific mode of external transport transfer to achieve the level of demand will affect the next phase of this urban transport mode transfer to specific external transport demand transfer, that is to improve the people's living standards, income levels, Per capita car ownership growth and other factors, the demand for transfer to achieve the level of demand also will continue to increase in the current period of time to achieve a lower level of demand to achieve the collection of passengers in the next time period there will be a trend Choose to achieve a higher level of transport to transfer, so that different urban transport mode transfer between the changes in demand and transfer. Here you can define the urban integrated transport hub transfer requirements as follows:  $D = DQ, DH$ .

The transfer demand of the city integrated transportation hub and the realization level of the transfer demand are the two representations of the demand for transfer. In this paper, quantitative analysis of the transfer demand of urban integrated transportation hub will also quantitatively deal with the realization level of transfer demand and quantitative analysis.

## 5 CONCLUSION

This paper investigates and collects data and analyzes the passenger's willingness of passengers in China's typical integrated transportation hub. It is necessary to use the method of data collection, direct inquiry and network questionnaire to investigate and collect

the passenger's own attributes, travel properties and passenger service services related to the passenger hub. The hotel is located in the north of the city, Characteristics, influencing factors and passenger preference choice results. It can be seen from the analysis results that the income, age and travel nature of visitors have a significant effect on the choice of willingness.

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