ABSTRACT

Title   On Modal Choice and Transportation Facilities Development in Cities

Doctor Course in   Civil Engineering and Architecture   Doctor   of   Engineering

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[Abstract]（1,000words, 10points, single space)

With the social and economic development, urban functions are gradually improving, living standards are gradually increasing, and residents' trip modes have also been greatly changed. Residents' trip has started to shift from non-motorized trip to motorized trip and the proportion of private motorized trip is getting higher and higher, but this has led to a lot of traffic problems, such as environmental pollution, traffic congestion and low trip efficiency, especially in the developing cities, as the speed of traffic infrastructure construction increases, it does not solve the traffic problem very well, instead, the more traffic infrastructure the more traffic problems occur. In Tokyo, there are the similar traffic problems since the 1850s, with serious air pollution and traffic congestion. However, Tokyo has successfully solved these problems with many years of construction and development. Now, Tokyo has a well-developed public transport network, especially the railway transport network, extends in all directions. The structure of residents' trip modes has been greatly improved and optimized. In the dissertation, summarizing and combing the successful experience of Tokyo transportation development and optimizing the structure of residents' trip modes, comparing with Tokyo, combing the problems of urban traffic and the structure of residents' trip modes with that of Tokyo, it can provide reference for the traffic planning, improvement of the developing cities and the adjustment of residents' trip modes, etc.

Based on the "5th Tokyo metropolitan area personal trip survey", this paper used the Ward hierarchical clustering algorithm in cluster analysis to cluster 23 wards of Tokyo and the principal component analysis was used to analyze and compare the principal component of modal choices data in 23 wards of Tokyo, Beijing and Shanghai.

1. Analyzed the research background, proposed the research purpose, the research content and research flow.

2. The literature is reviewed and summarized, including: the development of traffic pattern structure and modal choices influencing factors (individual and group factors), development and application of cluster analysis and principal component analysis. Puts

forward own conclusions, the research mainly concentrates on the influence of macroscopic factor and microcosmic factor on residents' trip, and then found the research of comparative analysis between international cities is lesser. The main gap of urban traffic development can be sorted out by comparison and analysis (cluster analysis and principal component analysis), and the experience and reference of urban transportation are provided.

3. The development history of Tokyo, Beijing and Shanghai, especially the rail transit, the main traffic policy history and road network structure are sorted out, and found that the development of Tokyo rail transit and urban development, population distribution has a close relationship, urban spatial expansion and population distribution are with the expansion of rail transit and distribution, and Beijing and Shanghai appeared different situations, the development of rail transit after the urban development is a certain extent, there are many difficulties and problems need to face.

4. Based on the distribution of population and population density in the three Circles of Tokyo special wards during the day and night, analyzed the law of population flow, the generation and regularity of commuting flow and school-based flow and the orientation trend in each Circle, summarized the development experience of efficient transport in Tokyo. Through the analysis of the trip distribution in Tokyo 23 wards, it is found that urban sub-centers have good traffic attraction and population redistribution functions, the traffic distribution can be effectively carried out through the construction of urban sub-centers so as to relieve traffic pressure in the urban center and balance urban traffic pressure.

5. By comparing the composition of urban road network, road network density and urban road network area ratio, analyzed the construction and development of traffic infrastructure in comparative cities and focuses on the formation of rail transit network and the layout of urban traffic routes, found the differences and gaps between comparative cities in urban transport development, proposed some advices and measures for the developing cities in development of future traffic development.

Statistics and analysis of the residents' trip purpose and modal choices in 23 wards in Tokyo show that the residents' main trip modal choices in 23 wards tend to rail transit and walking, but the proportion of non-public transport (private cars, etc.) is relatively high in comparative cities and with the increase year by year.

Collating and analyzing air pollution caused by air pollutants from various modes of trip and laws and policies governing air pollution in Tokyo can provide a good direction and successful experience for structural adjustment and air pollution control of residents in developing cities.

The air pollution caused by traffic pollutant emission, laws and measures to govern air pollution in Tokyo are summarized and analyzed, proposed experience and measures of air pollution control caused by traffic in Tokyo, that can provide a good development direction and successful experience for the urban residents to adjust their traffic patterns, prevent air

pollution and then improve the air quality.

 6. Principal component analysis was used to analyze the principal components based on the data of residents' trip mode share in 23 wards of Tokyo, Beijing and Shanghai and 2 principal components were obtained through the data standardization, eigenvalues, eigenvectors and principal components. Principal component 1 is public transportation and walking, Principal component 2 is motor vehicles and other trip modes, and through the scatter plot matrix, the distribution of the main component score and other means, the 23 wards of Tokyo, Beijing and Shanghai residents' trip modes structure were compared, analyzed and concluded that residents trips in Tokyo are mainly rely on public transport, and that Beijing and Shanghai are gradually formed the trend that residents' trip mode transform from public transportation to motor vehicle. And the relationship of various trip modes in Tokyo can provide references to the other cities in the future.

 Finally, the advice and suggestions are put forward for the transportation planning, construction and development of developing cities.

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