

Fine-Scale Modeling the Influencing Factors of Multi-Time Dimensions of Transit Ridership at Station Level: The Study of Guangzhou City

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Abstract : Nowadays, China is experiencing rapidly urban rail transit expansions in the world. The purpose of this study is to finely model factors influencing transit ridership at multi-time dimensions within transit stations' pedestrian catchment area (PCA) in Guangzhou, China. This study was based on multi-sources spatial data, including smart card data, high spatial resolution images, points of interest (POIs), real-estate online data and building height data. Eight multiple linear regression models using backward stepwise method and Geographic Information System (GIS) were created at station-level. According to Chinese code for classification of urban land use and planning standards of development land, residential land-use were divided into three categories: first-level (e.g. villa), second-level (e.g. community) and third-level (e.g. urban villages). Finally, it concluded that: (1) four factors (CBD dummy, number of feeder bus route, number of entrance or exit and the years of station operation) were proved to be positively correlated with transit ridership, but the area of green land-use and water land-use negative correlated instead. (2) The area of education land-use, the second-level and third-level residential land-use were found to be highly connected to the average value of morning peak boarding and evening peak alighting ridership. But the area of commercial land-use and the average height of buildings, were significantly positive associated with the average value of morning peak alighting and evening peak boarding ridership. (3) The area of the second-level residential land-use was rarely correlated with ridership in other regression models. Because private car ownership is still large in Guangzhou now, and some residents living in the community around the stations go to work by transit at peak time, but others are much more willing to drive their own car at non-peak time. The area of the third-level residential land-use, like urban villages, was highly positive correlated with ridership in all models, indicating that residents who live in the third-level residential land-use are the main passenger source of the Guangzhou Metro. (4) The diversity of land-use was found to have a significant impact on the passenger flow on the weekend, but was non-related to weekday. The findings can be useful for station planning, management and policymaking.

Keywords : fine-scale modeling, Guangzhou city, multi-time dimensions, multi-sources spatial data, transit ridership

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