

Associations between Sharing Bike Usage and Characteristics of Urban Street Built Environment in Wuhan, China

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Abstract : As a low-carbon travel mode, bicycling has drawn increasing political interest in the contemporary Chinese urban context, and the public sharing bikes have become the most popular ways of bike usage in China now. This research aims to explore the spatial-temporal relationship between sharing bike usage and different characteristics of the urban street built environment. In the research, street segments were used as the analytic unit of the street built environment defined by street intersections. The sharing bike usage data in the research include a total of 2.64 million samples that are the entire sharing bike distribution data recorded in two days in 2018 within a neighborhood of 185.4 hectares in the city of Wuhan, China. And these data are assigned to the 97 urban street segments in this area based on their geographic location. The built environment variables used in this research are categorized into three sections: 1) street design characteristics, such as street width, street greenery, types of bicycle lanes; 2) condition of other public transportation, such as the availability of metro station; 3) Street function characteristics that are described by the categories and density of the point of interest (POI) along the segments. Spatial Lag Models (SLM) were used in order to reveal the relationships of specific urban streets built environment characteristics and the likelihood of sharing bicycling usage in whole and different periods a day. The results show: 1) there is spatial autocorrelation among sharing bicycling usage of urban streets in case area in general, non-working day, working day and each period of a day, which presents a clustering pattern in the street space; 2) a statistically strong association between bike sharing usage and several different built environment characteristics such as POI density, types of bicycle lanes and street width; 3) the pattern that bike sharing usage is influenced by built environment characteristics depends on the period within a day. These findings could be useful for policymakers and urban designers to better understand the factors affecting bike sharing system and thus propose guidance and strategy for urban street planning and design in order to promote the use of sharing bikes.

Keywords : big data, sharing bike usage, spatial statistics, urban street built environment

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