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GIS-based multi-criteria analysis framework for geofence planning of dockless bike-sharing.

Dockless bike-sharing is growing in many cities around the globe. At the same time issues related to this type of urban mobility such as illegal or improper parking behavior are becoming more frequent. The implementation of parking zones delineated by geofences has been discussed as a possible solution for these issues. This master thesis project aims to develop a GIS-based multi-criteria analysis framework for the planning of geofences for dockless bike-sharing. The proposed method combined the analytic hierarchy process and an ideal point method to select locations for geofences and their capacity in the urban space. Criteria that contribute to bike-sharing usage were determined from the literature and data to represent them was generated using GIS. A case study was conducted and its result assessed using bike trip data. The results indicate that the bike-sharing suitability computed in this study has a significant correlation with bike-sharing demand. It was shown that the presented framework was capable of planning a geofence network that had good coverage of the study area. The proposed geofences had equivalent coverage of the study area as an existing bike-sharing docking station network. The capacity computed in the case study was shown to be mostly sufficient for the demand in the study area. The method presented in this thesis can be used to plan an initial geofence network for a new dockless bike-sharing system.

Keywords: Geomatics, GIS-MCDA, multi-criteria analysis, bike-sharing, dockless, geofence, AHP, VIKOR

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Master degree project 30 credits in Geomatics, 2021
Department of Physical Geography and Ecosystem Science, Lund University. Student thesis series INES nr xx