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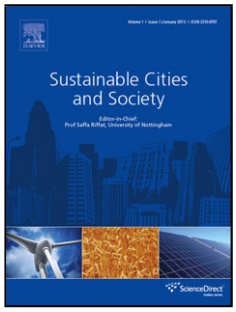

Title: Spatial Multi-criteria and Multi-scale Evaluation of Walkability Potential at Street Segment Level: A Case Study of Tehran

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<AT>Spatial Multi-criteria and Multi-scale Evaluation of Walkability Potential at Street Segment Level: A Case Study of Tehran
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<ABS-HEAD>Highlights► Providing urban planners with a suitable walkability measure and analysis tool at the street level ► This study will direct its attention to path-related built environment factors, those which influence people's propensity to walk and the length of their walks. ► A group decision-making approach (based on expert and non-expert preferences) was developed to rank street segments based on their walking potential. ► There are five indices in 2D-GIS and two indices in 3D-GIS environment as evaluation criteria.

<ABS-HEAD>Abstract

<ABS-P>The objective of this study was to evaluate the walkability of streets and to meet it the authors used a novel two-step methodology based on the integration of *geospatial information science*, *remote sensing* and *group multi-criteria analysis* to assess the walkability of pathways in a city. The author used a multi-criteria approach operating at the street level, and during the model's first step, each pathway received a walkability index score based on the following five evaluation criteria: pathway connectivity, access to public transportation, land-use mix, housing density and the greenness level. One key innovation used at this point in the process was that the weighting given to each criterion was determined through a public participation process in which 'experts' and 'non-experts' (residents) were asked to rate the criteria based on their importance in terms of encouraging people to walk. During the second step, both the presence of shade and being able to see landmarks when using the paths were measured and visualized using three-dimensional GIS tools, the aim being to identify those segments with the greatest likelihood of encouraging people to walk. The model developed in this study, has been tested and implemented across two neighborhoods in the capital city of Tehran. It was found some significant difference between the experts and residents' viewpoints about the importance of the evaluation factors for walkability evaluation. The residents expressed their views according to their daily needs, while experts' ideas were based more on their expertise in the field of urban planning. The local residents are more pessimistic and actually said that most parts of the case study area are unsuitable for walking. However, the results indicate that utilizing a *group multi-criteria analysis* to aggregate the viewpoints of the both groups should be a good approach.

<KWD>Keywords: Walkability and Built Environment; 3D-GIS; Multi-Criteria Evaluation; Group Decision Making; Sustainable Urban Planning.

Introduction

Various modes of travel suit different purposes but all are key parts of our urban transport systems. Cars are ideal for travelling long distances, while public transport is perfect for transporting large numbers of people to activity centers. Walking, as a mode of transport, is best for travelling short distances, and so a large proportion of urban journeys are performed on foot, and even those using other transportation facilities tend to also start and end their journeys with a short walk. Furthermore, a

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