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A new approach to Iranian green building assessment tool using decision making methods and GIS

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Green building can be considered as an efficient alternative for managing the energy consumption around the world. The aim of the present study was to complement and propose a new set of comprehensive factor suits assessing green buildings and to evaluate them in the Iranian local context to contribute a new green building rating tool for offices. Therefore, investigating previous studies, expert opinions and questionnaire forms, 8 major and 61 minor stakeholders were defined to cover all required criteria. These criteria were accurately weighted using multi criteria decision methods including analytical hierarchy process, weighted harmonic mean and Shannon's entropy. After that, Iranian Green Building Assessment Tool (IGBT), consisting five certification levels, was proposed based on weighted factors to improve environmental, social and economic aspects in the construction and design process. Aggregating IGBT, Geographical Information System (GIS) and Multi-Criteria Decision methods, the practical application of the suggested tool was applied on 48 offices through a case study in Mashhad, north-east of Iran. For this purpose, a spatial database of 612 land uses was prepared to assess certification levels of the office buildings in the study area. The assessment procedure, applied in GIS, demonstrated five certified green office buildings. Results of the proposed tool showed that energy efficiency and water efficiency, with the total score of 39%, play significant role in assessing green office buildings with respect to the vital conditions of energy and water consumption. Finally, comparing performance sensitivity to the five-representative green building rating systems, based on measuring the criteria deviations, confirmed the reliability of the suggested tool. The outcomes can provide a valuable reference to policy makers and designers and also can be a noticeable suggestion to the future studies.

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Identification of effect of urban neighborhood form on wind behavior environment using computational fluid dynamics (CFD)

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This paper aims at investigating the effects of built environment on the local wind-flow and pedestrian wind comfort. It focuses on urban blocks as the finest parcels of built environment and urban form. Several different configurations of urban blocks, each representing a different neighborhood type are selected and examined thoroughly. Firstly, we developed a neighborhood typology framework in terms of the street patterns, hierarchy and urban block's configurations. Subsequently four common types of neighborhoods are being identified in the context of Tehran city: type A- Shahrak Gharb (in north), type B: Haft hoz Narmak (east), type C-Apadana residential town (south), and type D: Oodlajan neighborhood (city center). In the next step a built area of 20 hectare is being chosen of the four different neighborhood types each with different footprint and density. A computer-based modeling with the use of "Computational Fluid Dynamic (CFD)" method and the "software FLUENT" is being applied to simulate wind behavior in each area. Equal meteorological conditions i.e. wind velocity and direction is being assumed in the simulation process. The findings demonstrate that wind velocity is associated with much more magnitude in the neighborhoods with higher footprints. The neighborhood type with the lowest amount of footprint (Type D - Apadana neighborhood) therefore, was observed to create more comfortable wind environment for the pedestrians; and is the most appropriate neighborhood form in the meteorological condition of Tehran.

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