Evaluating Urban City Indices: A Study for Investigating Functional Domains, Indicators and Integration Methods

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Abstract : Nowadays many cities around the world are investing their efforts and resources for the purpose of facilitating their citizen's life and making cities more livable and sustainable by implementing newly emerged phenomena of smart city. For this purpose, related research institutions prepare and publish smart city indices or benchmarking reports aiming to measure the city's current 'smartness' status. Several functional domains, various indicators along different selection and calculation methods are found within such indices and reports. The selection criteria varied for each institution resulting in inconsistency in the ranking and evaluating. This research aims to evaluate the impact of selecting such functional domains, indicators and calculation methods which may cause change in the rank. For that, six functional domains, i.e. Environment, Mobility, Economy, People, Living and governance, were selected covering 19 focus areas and 41 sub-focus (variable) areas. 60 out of 191 indicators were also selected according to several criteria. These were identified as a result of extensive literature review for 13 well known global indices and research and the ISO 37120 standards of sustainable development of communities. The values of the identified indicators were obtained from reliable sources for ten cities. The values of each indicator for the selected cities were normalized and standardized to objectively investigate the impact of the chosen indicators. Moreover, the effect of choosing an integration method to represent the values of indicators for each city is investigated by comparing the results of two of the most used methods i.e. geometric aggregation and fuzzy logic. The essence of these methods is assigning a weight to each indicator its relative significance. However, both methods resulted in different weights for the same indicator. As a result of this study, the alternation in city ranking resulting from each method was investigated and discussed separately. Generally, each method illustrated different ranking for the selected cities. However, it was observed that within certain functional areas the rank remained unchanged in both integration method. Based on the results of the study, it is recommended utilizing a common platform and method to objectively evaluate cities around the world. The common method should provide policymakers proper tools to evaluate their decisions and investments relative to other cities. Moreover, for smart cities indices, at least 481 different indicators were found, which is an immense number of indicators to be considered, especially for a smart city index. Further works should be devoted to finding mutual indicators representing the index purpose globally and objectively.