

عنوان مقاله:

Extending a Consensus-Based Fuzzy Ordered Weighting Average (FOWA) Model in New Water Quality Indices

محل انتشار:

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خلاصه مقاله:

In developing a specific WQI (Water Quality Index), many quality parameters are involved with different levels of importance. The impact of experts' different opinions and viewpoints, current risks affecting their opinions, and plurality of the involved parameters double the significance of the issue. Hence, the current study tries to apply a consensus-based FOWA (Fuzzy Ordered Weighting Average) model as one of the most powerful and well-known Multi-Criteria Decision- Making (MCDM) techniques to determine the importance of the used parameters in the development of such WQIs which is shown with an example. This operator has provided the capability of modeling the risks in decision-making through applying the optimistic degree of stakeholders and their power coupled with the use of fuzzy numbers. Totally, 22 water quality parameters for drinking purposes were considered in this study. To determine the weight of each parameter, the viewpoints of 4 decision-making groups of experts were taken into account. After determining the final weights, to validate the use of each parameter in a potential WQI, consensus degrees of both the decision makers and the parameters are calculated. The highest and the lowest weight values, 0.999 and 0.073 respectively, were related to Hg and temperature. Regarding the type of consumption that was drinking, the parameters' weights and ranks were consistent with their health impacts. Moreover, the decision makers' highest and lowest consensus degrees were 0.9905 and 0.9669, respectively. Among the water quality parameters, temperature (with consensus degree of 0.9972) and Pb (with consensus degree of 0.9665), received the highest and lowest agreement with the decision-making group. This study indicated that the weight of parameters in determining water quality largely depends on the experts' opinions and approaches. Moreover, using the FOWA model provides results accurate and closer- to-reality on the significance of each of the water quality parameters. Thus, using this operator can be a precise and appropriate method to determine the parameters' weights and importance in order to .develop specific WQIs for drinking, industrial, and agricultural purposes

کلمات کلیدی:

MCDM, FOWA Model, Consensus, Fuzzy Number, Water Quality Index

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