

Ranking of wastewater reuse allocation alternatives using a variance-based weighted aggregated sum product assessment method

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Abstract

This study develops a multi-criteria decision-making framework for optimizing the ranking of wastewater reuse allocation alternatives in a water/wastewater supply system. The method of stepwise weight assessment ratio analysis is used for weighting economic, socio-cultural, environmental, and technologic criteria and their 15 sub-criteria. The optimized weighted aggregated sum product assessment (WASPAS) method evaluates the optimal wastewater allocation alternatives. The last framework step performs a sensitivity analysis of the results. The results indicate the environmental alternative with a score of 0.176 is the best alternative, followed by landscape irrigation, industrial reuse, artificial recharge of aquifer, recreational, and agricultural irrigation in decreasing order of merit. The results of the sensitivity analysis show that changing the joint criteria of the alternatives' importance alters the relative importance of the alternatives but does not change their final ranking, thus demonstrating the reliability of wastewater allocations ranking by the optimized WASPAS method. © 2021, The Author(s), under exclusive licence to Springer Nature B.V.

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