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A FUZZY MULTI-CRITERIA DECISION MAKING APPROACH FOR EVALUATING THE HEALTH-CARE WASTE TREATMENT ALTERNATIVES

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Abstract

Hierarchical distance-based fuzzy multi-criteria group decision making (DBF-MCDM) was applied to evaluate the health-care waste (HCW) treatment alternatives for Qom hospitals. A list of aspects consisting of 6 criteria and 21 sub-criteria were evaluated based on a linguistic term set by five decision-makers. Also, four HCW treatment alternatives including “incineration”, “steam sterilization”, “chemical disinfection” and “controlled landfill” were evaluated according to these aspects. Data were aggregated and normalized to obtain Performance Ratings of Alternatives (PRAs). Then, the PRAs were aggregated again to achieve the Aggregate Performance Ratings (APRs). After renormalization, the weighted distances (WDs) from ideal solution (D_i^*) and anti-ideal solution (D_i^-) were calculated. Finally, the proximity of each alternative to the ideal solution (Ω_i^*) was computed. The alternatives were ranked according to the magnitude of Ω_i^* values. Results demonstrated that “controlled landfill” was the most appropriate alternative for the HCW treatment of Qom hospitals and “steam sterilization” was the second acceptable treatment option. A novel configuration of criteria and sub-criteria was proposed based on the public health and occupational health risks. The criterion “Occupational Health” was added to the list of criteria to distinguish the health risks on public and those related to the healthcare waste management workers. Also, a new concept of “land requirement” was presented. The limitations of high-tech alternatives were also considered according to the level of dependency on overseas.

Key words: fuzzy logic, health-care waste, hospital, MCDM, treatment alternative

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