

Fuzzy group decision making and its application in water resource planning and management

HOJJAT MIANABADI¹ & ABBAS AFSHAR²

¹ *Dams and Hydropower Department, Tooss Ab Consulting Engineers Co., Department of Civil Engineering, Iran University of Science and Technology, Narmak, PO Box 16765-163, Tehran, Iran*
hmianabadi@civileng.iust.ac.ir

² *Department of Civil Engineering, Iran University of Science and Technology, Narmak, PO Box 16765-163, Tehran, Iran*

Abstract Multi-criteria decision making (MCDM) and group decision making (GDM) are two well practiced approaches for solving decision-making problems. Group decision making combines opinions from decision makers (DMs) into a coherent group decision. The aim of this paper is to develop a new fuzzy group decision making algorithm and apply it to a real-world groundwater development problem to select the most preferred alternative. Five DMs were selected to express their judgments about the relative importance of the criteria (water pumped, cost, and risk) and have given their preferences as ordinal preferences, utility values, fuzzy preference relations and multiplicative preference relations. The decision makers' opinions were aggregated based on a fuzzy group decision making. An ordered weighted-averaging (OWA) operator has been used to aggregate decision makers' opinions. A consensus measure is also defined to evaluate convergence between the group and individual opinions. The outcomes of the proposed algorithm show that the proposed fuzzy group decision making approach is a relevant approach to aggregate the individual expert's opinion and is a desirable tool to reach consensus among DMs.

Keywords fuzzy group decision making; groundwater resource management; aggregation