

Hybrid Fuzzy MCDM Model for Oil and Gas Well Selection: A Case Study of NIOC

Davood Mohammadi¹, Sasan Barak², and Reza Moghdani³

¹Hull University Business School

²University of Southampton Business School

³University of Huddersfield Department of Logistics Marketing Hospitality and Analytics

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Abstract

This paper aims to address the challenges faced in selecting the most suitable oil and gas (OG) well alternative for stimulation operations to improve production and recovery possibilities in hydrocarbon reservoirs. To achieve this, a novel combination of multiple criteria decision-making (MCDM) models has been proposed, and an illustrative study has been carried out in Iranian hydrocarbon reservoirs. Fourteen criteria based on engineering and managerial perspectives have been identified, and the appropriate weights of these criteria have been determined using a novel interval-valued spherical fuzzy (IVSF) entropy method. Four fuzzy ranking algorithms have been established to select the proper well, and the achieved results have been combined using the Borda method. To evaluate the robustness of experimental results, a sensitivity analysis has been implemented. The proposed method not only enhances the accuracy of OG reservoir selection but also reduces the risk associated with conventional economic predictions for carbonate reservoirs by considering the influencing factors of the development process. Overall, this paper offers an efficient and effective approach for selecting the best OG well alternative in the National Iranian Oil Company (NIOC), which can be valuable for both managerial and technical perspectives in the oil and gas sector.

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